

**2038 ALTERNATIVE C**

**PM Peak**



**BAKERSFIELD CENTENNIAL CORRIDOR TRAFFIC OPERATIONS ANALYSIS**  
**YR2038 Alt.C INTERSECTION ANALYSIS RESULTS - PM PEAK**

Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
<b>1. I-5 SB Ramps @ Stockdale Hwy</b>						
SB - I-5 SB Off ramp - STOP Control	569	534	94%	52.1	F	E
EB - Stockdale Hwy	192	191	99%	0.0	A	
WB - Stockdale Hwy	75	69	92%	0.4	A	
<b>Intersection Total</b>	<b>836</b>	<b>794</b>	<b>95%</b>			
<b>2. I-5 NB Ramps @ Stockdale Hwy</b>						
NB - I-5 NB Off Ramp - STOP Control	58	64	110%	11.6	B	A
EB - Stockdale Hwy	732	694	95%	0.0	A	
WB - Stockdale Hwy	417	378	91%	0.0	A	
<b>Intersection Total</b>	<b>1,207</b>	<b>1,136</b>	<b>94%</b>			
<b>4. Enos Ln @ Stockdale Hwy</b>						
NB - Enos Ln	454	447	98%	62.3	E	C
SB - Enos Ln	248	246	99%	17.7	B	
EB - Stockdale Hwy	798	754	94%	24.3	C	
WB - Stockdale Hwy	518	512	99%	15.3	B	
<b>Intersection Total</b>	<b>2,018</b>	<b>1,959</b>	<b>97%</b>	<b>29.8</b>		
<b>5. SR- 43 @ I-5 NB Ramps</b>						
NB - SR- 43	763	741	97%	0.0	A	A
SB - SR-43	460	460	100%	0.0	A	
WB - I-5 NB Off Ramp - STOP Control	87	78	90%	13.5	B	
<b>Intersection Total</b>	<b>1,310</b>	<b>1,279</b>	<b>98%</b>			
<b>6. SR-43 @ I-5 SB Ramps</b>						
NB - SR- 43	562	558	99%	0.0	A	A
SB - SR-43	387	350	90%	1.6	A	
EB - I-5 SB Ramp - STOP Control	235	213	91%	18.1	C	
<b>Intersection Total</b>	<b>1,184</b>	<b>1,121</b>	<b>95%</b>			
<b>7. Nord Rd @ Stockdale Hwy</b>						
NB - Nord Rd	413	414	100%	11.8	B	C
SB - Nord Rd	102	103	101%	38.1	D	
EB - Stockdale Hwy	1,040	964	93%	24.3	C	
WB - Stockdale Hwy	1,214	1,250	103%	22.6	C	
<b>Intersection Total</b>	<b>2,769</b>	<b>2,731</b>	<b>99%</b>	<b>22.1</b>		
<b>9. Heath Rd @ Stockdale Rd</b>						
NB - Heath Rd	869	856	99%	27.2	C	C
SB - Heath Rd	227	228	100%	73.0	E	
EB - Stockdale Hwy	1,848	1,786	97%	19.4	B	
WB - Stockdale Hwy	2,350	2,355	100%	20.6	C	
<b>Intersection Total</b>	<b>5,294</b>	<b>5,225</b>	<b>99%</b>	<b>23.6</b>		
<b>10. WSP @ Stockdale Off/ On</b>						

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Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
NB - Stockdale Hwy	379	379	100%	26.0	C	
EB - Stockdale Hwy	2,688	2,629	98%	5.2	A	A
WB - WSP	2,230	2,241	100%	4.5	A	
<b>Intersection Total</b>	<b>5,297</b>	<b>5,249</b>	<b>99%</b>	<b>6.4</b>		
<b>11. West Beltway @ WSP WB Ramps</b>						
NB - West Beltway	1,657	1,681	101%	12.8	B	
SB - West Beltway	2,743	2,749	100%	25.4	C	B
WB - WSP WB Off Ramp	2,220	2,115	95%	7.1	A	
<b>Intersection Total</b>	<b>6,620</b>	<b>6,545</b>	<b>99%</b>	<b>16.3</b>		
<b>12. West Beltway @ WSP EB Ramps</b>						
NB - West Beltway	1,987	1,975	99%	9.6	A	
SB - West Beltway	1,748	1,704	97%	12.8	B	B
EB - WSP EB off Ramp	850	864	102%	27.6	C	
<b>Intersection Total</b>	<b>4,585</b>	<b>4,543</b>	<b>99%</b>	<b>14.2</b>		
<b>14. Allen Rd @ Brihmall Rd</b>						
NB - Allen Rd	1,970	1,898	96%	25.5	C	
SB - Allen Rd	1,532	1,540	101%	36.0	D	C
EB - Brihmall Rd	428	420	98%	15.2	B	
WB - Brihmall Rd	795	780	98%	24.2	C	
<b>Intersection Total</b>	<b>4,725</b>	<b>4,638</b>	<b>98%</b>	<b>27.8</b>		
<b>15. Allen Rd @ WSP WB Ramps</b>						
NB - Allen Rd	1,010	982	97%	42.1	D	
SB - Allen Rd	1,774	1,795	101%	21.6	C	C
WB - Off Ramp/On Ramp WSP WB	2,101	1,982	94%	8.8	A	
<b>Intersection Total</b>	<b>4,885</b>	<b>4,759</b>	<b>97%</b>	<b>20.5</b>		
<b>16. Allen Rd @ WSP EB Ramps</b>						
NB - Allen Rd	1,935	1,911	99%	15.4	B	
SB - Allen Rd	2,470	2,428	98%	12.4	B	B
EB - WSP EB off Ramp	296	298	101%	15.0	B	
<b>Intersection Total</b>	<b>4,701</b>	<b>4,637</b>	<b>99%</b>	<b>13.8</b>		
<b>18. Allen Rd @ Stockdale Hwy</b>						
NB - Allen Rd	1,094	1,108	101%	20.6	C	
SB - Allen Rd	1,605	1,477	92%	19.9	B	C
EB - Stockdale Hwy	1,033	1,030	100%	42.2	D	
WB - Stockdale Hwy	1,614	1,606	100%	31.8	C	
<b>Intersection Total</b>	<b>5,346</b>	<b>5,221</b>	<b>98%</b>	<b>28.1</b>		
<b>20. Calloway Dr @ Brimhall Rd</b>						
NB - Calloway Dr	2,374	2,250	95%	32.6	C	
SB - Calloway Dr	1,916	1,910	100%	34.2	C	C

**BAKERSFIELD CENTENNIAL CORRIDOR TRAFFIC OPERATIONS ANALYSIS**  
**YR2038 Alt.C INTERSECTION ANALYSIS RESULTS - PM PEAK**

Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
EB - Brimhall Rd	769	766	100%	25.3	C	C
WB - Brimhall Rd	1,697	1,697	100%	28.7	C	
<b>Intersection Total</b>	<b>6,756</b>	<b>6,623</b>	<b>98%</b>	<b>31.2</b>		
<b>21. Calloway Dr @ WSP WB Ramps</b>						
NB - Calloway Dr	1,873	1,822	97%	29.8	C	
SB - Calloway Dr	2,487	2,542	102%	17.6	B	
EB - WSP WB on Ramp	1,265	1,230	97%	15.6	B	C
WB - WSP WB Off Ramp	950	906	95%	14.5	B	
<b>Intersection Total</b>	<b>6,575</b>	<b>6,500</b>	<b>99%</b>	<b>20.2</b>		
<b>22. Calloway Dr @ WSP EB Ramps</b>						
NB - Calloway Dr	1,475	1,488	101%	6.4	A	
SB - Calloway Dr	2,182	2,208	101%	8.5	A	A
EB - WSP EB off Ramp	825	765	93%	14.0	B	
<b>Intersection Total</b>	<b>4,482</b>	<b>4,461</b>	<b>100%</b>	<b>8.7</b>		
<b>23. Calloway Dr @ Stockdale Hwy</b>						
NB - Calloway Dr	1,954	1,956	100%	40.0	D	
SB - Calloway Dr	2,609	2,612	100%	28.4	C	
EB - Stockdale Hwy	1,906	1,889	99%	46.4	D	D
WB - Stockdale Hwy	1,399	1,394	100%	29.8	C	
<b>Intersection Total</b>	<b>7,868</b>	<b>7,851</b>	<b>100%</b>	<b>35.9</b>		
<b>25. Coffee Rd @ Brimhall Rd</b>						
NB - Coffee Rd	1,839	1,857	101%	31.1	C	
SB - Coffee Rd	2,164	2,163	100%	28.9	C	
EB - Brimhall Rd	1,160	1,158	100%	29.0	C	C
WB - Brimhall Rd	2,110	1,990	94%	34.7	C	
<b>Intersection Total</b>	<b>7,273</b>	<b>7,168</b>	<b>99%</b>	<b>31.1</b>		
<b>27. Coffee Rd @ WSP EB Ramp</b>						
NB - Coffee Rd	2,889	2,930	101%	22.1	C	
SB - Coffee Rd	2,383	2,449	103%	6.2	A	B
EB - WSP EB off Ramp	875	827	95%	9.4	A	
<b>Intersection Total</b>	<b>6,147</b>	<b>6,206</b>	<b>101%</b>	<b>14.1</b>		
<b>28. Coffee Rd @ Truxtun Ave</b>						
NB - Coffee Rd	2,842	2,838	100%	13.9	B	
SB - Coffee Rd	1,829	1,857	102%	14.9	B	B
WB - Truxtun Ave	1,368	1,368	100%	29.9	C	
<b>Intersection Total</b>	<b>6,039</b>	<b>6,063</b>	<b>100%</b>	<b>17.8</b>		
<b>31. Mohawk St @ WSP WB Ramps</b>						
NB - Mohawk St	1,225	1,258	103%	5.6	A	
SB - Mohawk St	2,478	2,424	98%	8.1	A	A

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Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
WB - WSP WB Off Ramp	790	724	92%	11.6	B	
<b>Intersection Total</b>	<b>4,493</b>	<b>4,406</b>	<b>98%</b>	<b>8.0</b>		
<b>32. Mohawk St @ WSP EB Ramps</b>						
NB - Mohawk St	2,095	2,141	102%	15.3	B	
SB - Mohawk St	1,709	1,640	96%	15.0	B	B
EB - WSP EB off Ramp	1,700	1,706	100%	12.8	B	
<b>Intersection Total</b>	<b>5,504</b>	<b>5,487</b>	<b>100%</b>	<b>14.4</b>		
<b>33. Mohawk St @ Truxtun Ave</b>						
NB - Mohawk St	2,080	2,083	100%	27.9	C	
SB - Mohawk St	2,026	2,021	100%	31.4	C	
EB - Truxtun Ave	823	814	99%	21.8	C	C
WB - Truxtun Ave	1,086	1,291	119%	34.8	C	
<b>Intersection Total</b>	<b>6,015</b>	<b>6,209</b>	<b>103%</b>	<b>29.7</b>		
<b>36. Airport Dr &amp; State Rd/SR204 WB Ramp</b>						
NB - Airport Dr	1,915	1,854	97%	19.8	B	
SB - Airport Dr	1,777	1,776	100%	23.1	C	
EB - State Rd	259	263	102%	16.7	B	C
WB - SR204 WB Off Ramp	1,375	1,372	100%	24.3	C	
<b>Intersection Total</b>	<b>5,326</b>	<b>5,265</b>	<b>99%</b>	<b>21.9</b>		
<b>37. Buck Owens Blvd &amp; SR99 NB Ramp</b>						
NB - SR99 NB Off Ramp	1,420	1,299	91%	16.5	B	
WB - Buck Owens Blvd	869	900	104%	3.0	A	B
<b>Intersection Total</b>	<b>2,289</b>	<b>2,199</b>	<b>96%</b>	<b>11.0</b>		
<b>38. Rio Mirada Dr &amp; Buck Owens Blvd</b>						
NB - Buck Owens Blvd	823	819	100%	36.8	D	
SB - Buck Owens Blvd	65	64	98%	22.3	C	
EB - Rio Mirada Dr	561	335	60%	12.5	B	C
WB - Rio Mirada Dr	399	398	100%	21.7	C	
<b>Intersection Total</b>	<b>1,848</b>	<b>1,616</b>	<b>87%</b>	<b>27.5</b>		
<b>39. SR99 NB Ramps/Sillect Ave &amp; Buck Owens Blvd</b>						
NB - Buck Owens Blvd	1,231	1,156	94%	42.4	D	
SB - Buck Owens Blvd	644	630	98%	46.2	D	
EB - SR99 NB Off Ramp	375	344	92%	42.2	D	D
WB - Sillect Ave	630	639	101%	39.6	D	
<b>Intersection Total</b>	<b>2,880</b>	<b>2,769</b>	<b>96%</b>	<b>42.6</b>		
<b>40. Rosedale Hwy &amp; Camino del Rio Ct</b>						
NB - Camino del Rio Ct	449	442	98%	68.8	E	
SB - Camino del Rio Ct	489	492	101%	65.3	E	
EB - Rosedale Hwy	2,462	2,350	95%	44.3	D	D

**BAKERSFIELD CENTENNIAL CORRIDOR TRAFFIC OPERATIONS ANALYSIS**  
**YR2038 AIL.C INTERSECTION ANALYSIS RESULTS - PM PEAK**

Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
WB - Rosedale Hwy	3,233	3,053	94%	34.5	C	
<b>Intersection Total</b>	<b>6,633</b>	<b>6,337</b>	<b>96%</b>	<b>46.4</b>		
<b>41. Rosedale Hwy &amp; SR99 SB Ramp</b>						
SB - SR99 SB Off Ramp	1,301	1,302	100%	35.7	D	
EB - Rosedale Hwy	1,936	1,870	97%	8.6	A	C
WB - Rosedale Hwy	2,312	2,159	93%	26.8	C	
<b>Intersection Total</b>	<b>5,549</b>	<b>5,331</b>	<b>96%</b>	<b>22.6</b>		
<b>42. Rosedale Hwy &amp; SR99 NB Ramp/Buck Owens Blvd</b>						
NB - SR99 NB Off Ramp	1,670	1,563	94%	58.4	E	
SB - Buck Owens Blvd	1,092	1,071	98%	35.1	D	
EB - Rosedale Hwy	2,315	2,236	97%	20.8	C	D
WB - 24th St	2,922	2,882	99%	26.2	C	
<b>Intersection Total</b>	<b>7,999</b>	<b>7,752</b>	<b>97%</b>	<b>37.7</b>		
<b>43. 24th St &amp; Oak St</b>						
NB - Oak St	1,600	1,611	101%	34.6	C	
SB - Oak St	103	102	99%	55.1	E	
EB - 24th St	3,018	2,865	95%	48.2	D	D
WB - 24th St	3,232	3,183	98%	27.4	C	
<b>Intersection Total</b>	<b>7,953</b>	<b>7,761</b>	<b>98%</b>	<b>36.9</b>		
<b>45. Oak St @ Truxtun Ave</b>						
NB - Oak St	1,164	1,121	96%	32.9	C	
SB - Oak St	1,988	1,965	99%	41.2	D	
EB - Truxtun Ave	2,423	2,225	92%	45.4	D	D
WB - Truxtun Ave	1,830	1,815	99%	68.4	E	
<b>Intersection Total</b>	<b>7,405</b>	<b>7,126</b>	<b>96%</b>	<b>48.1</b>		
<b>46. California Ave &amp; Chester Ln</b>						
NB - Chester Ln	207	198	96%	76.5	E	
SB - Chester Ln	576	314	55%	216.9	F	
EB - California Ave	1,820	1,482	81%	69.2	E	F
WB - California Ave	1,849	1,962	106%	93.4	F	
<b>Intersection Total</b>	<b>4,452</b>	<b>3,956</b>	<b>89%</b>	<b>121.3</b>		
<b>47. California Ave &amp; SR99 SB Ramps/Real Rd</b>						
NB - Real Rd	695	674	97%	102.0	F	
SB - SR99 SB Off Ramp	1,625	1,686	104%	22.7	C	
EB - California Ave	2,281	1,607	70%	127.4	F	F
WB - California Ave	1,361	1,440	106%	95.9	F	
<b>Intersection Total</b>	<b>5,962</b>	<b>5,407</b>	<b>91%</b>	<b>83.2</b>		
<b>48. California Ave &amp; SR99 NB Ramps</b>						
NB - SR99 NB Off Ramp	655	691	105%	27.7	C	

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SB - Extended Stay Hotel	107	106	99%	37.6	D	C
EB - California Ave	1,479	1,438	97%	20.9	C	
WB - California Ave	2,470	2,303	93%	25.2	C	
<b>Intersection Total</b>	<b>4,711</b>	<b>4,538</b>	<b>96%</b>	<b>24.5</b>		
<b>49. California Ave &amp; Oak St</b>						
NB - Oak St	1,129	1,107	98%	40.7	D	E
SB - Oak St	1,751	1,599	91%	79.6	E	
EB - California Ave	1,770	1,766	100%	57.0	E	
WB - California Ave	1,451	1,440	99%	48.9	D	
<b>Intersection Total</b>	<b>6,101</b>	<b>5,912</b>	<b>97%</b>	<b>58.1</b>		
<b>51. Stockdale Hwy &amp; Real Rd</b>						
NB - Real Rd	885	818	92%	84.8	F	F
SB - Real Rd	824	793	96%	76.4	E	
EB - Stockdale Hwy	1,522	1,187	78%	133.5	F	
WB - Stockdale Hwy	1,075	1,097	102%	61.2	E	
<b>Intersection Total</b>	<b>4,306</b>	<b>3,895</b>	<b>90%</b>	<b>91.3</b>		
<b>53. Stockdale Hwy &amp; Oak St/Wible Rd</b>						
NB - Wible Rd	807	810	100%	29.6	C	C
SB - Oak St	976	979	100%	22.9	C	
EB - Stockdale Hwy	883	706	80%	37.6	D	
WB - Stockdale Hwy	797	794	100%	34.9	C	
<b>Intersection Total</b>	<b>3,463</b>	<b>3,289</b>	<b>95%</b>	<b>30.6</b>		
<b>54. SR58 Ramps &amp; Real Rd</b>						
NB - Real Rd	676	615	91%	49.4	D	C
SB - Real Rd	1,120	958	86%	34.7	C	
WB - SR58 WB	870	860	99%	29.2	C	
<b>Intersection Total</b>	<b>2,666</b>	<b>2,433</b>	<b>91%</b>	<b>39.9</b>		
<b>57. Ming Ave &amp; Real Rd</b>						
NB - Real Rd	479	478	100%	38.4	D	C
SB - Real Rd	727	718	99%	70.1	E	
EB - Ming Ave	2,008	2,006	100%	18.5	B	
WB - Ming Ave	2,459	2,397	97%	22.1	C	
<b>Intersection Total</b>	<b>5,673</b>	<b>5,599</b>	<b>99%</b>	<b>28.4</b>		
<b>58. Ming Ave &amp; SR99 SB Ramps</b>						
EB - Ming Ave	2,238	2,266	101%	16.2	B	B
WB - Ming Ave	1,596	1,621	102%	14.0	B	
<b>Intersection Total</b>	<b>3,834</b>	<b>3,887</b>	<b>101%</b>	<b>15.8</b>		
<b>59. Ming Ave &amp; Wible Rd</b>						
NB - Wible Rd	802	799	100%	31.9	C	

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SB - Wible Rd	933	932	100%	46.5	D	C
EB - Ming Ave	2,585	2,517	97%	24.1	C	
WB - Ming Ave	1,743	1,791	103%	20.2	C	
<b>Intersection Total</b>	<b>6,063</b>	<b>6,039</b>	<b>100%</b>	<b>27.4</b>		
<b><u>60. Ming Ave &amp; SR99 NB Ramps</u></b>						
NB - Sears	334	335	100%	36.1	D	C
SB - SR99 SB Off Ramp	886	873	99%	21.7	C	
EB - Ming Ave	2,307	2,337	101%	25.1	C	
WB - Ming Ave	1,610	1,636	102%	54.5	D	
<b>Intersection Total</b>	<b>5,137</b>	<b>5,181</b>	<b>101%</b>	<b>34.5</b>		
<b><u>61. Ming Ave &amp; Castro Ln</u></b>						
NB - Castro Ln	394	394	100%	30.7	C	D
SB - Castro Ln	336	334	99%	21.8	C	
EB - Ming Ave	1,395	1,412	101%	38.4	D	
WB - Ming Ave	1,294	1,296	100%	38.4	D	
<b>Intersection Total</b>	<b>3,419</b>	<b>3,436</b>	<b>100%</b>	<b>35.9</b>		
<b><u>66. Brundage Ln &amp; H St</u></b>						
NB - H St	798	778	97%	14.3	B	C
SB - H St	913	912	100%	27.0	C	
EB - Brundage Ln	638	636	100%	31.7	C	
WB - Brundage Ln	749	737	98%	31.3	C	
<b>Intersection Total</b>	<b>3,098</b>	<b>3,063</b>	<b>99%</b>	<b>25.8</b>		
<b><u>67. SR58 WB Ramp &amp; H St</u></b>						
NB - H St	807	794	98%	25.7	C	D
SB - H St	1,142	1,141	100%	37.2	D	
WB - Richland St	699	692	99%	26.5	C	
<b>Intersection Total</b>	<b>2,648</b>	<b>2,627</b>	<b>99%</b>	<b>35.9</b>		
<b><u>68. SR58 EB Ramp &amp; H St</u></b>						
NB - H St	847	847	100%	26.8	C	C
SB - H St	1,143	1,153	101%	27.9	C	
EB - SR58 EB Off Ramp	745	712	96%	17.1	B	
<b>Intersection Total</b>	<b>2,735</b>	<b>2,712</b>	<b>99%</b>	<b>26.2</b>		
<b><u>70. Brundage Ln &amp; Chester Ave</u></b>						
NB - Chester Ave	836	816	98%	16.5	B	C
SB - Chester Ave	1,274	1,272	100%	26.5	C	
EB - Brundage Ln	580	551	95%	42.5	D	
WB - Brundage Ln	597	598	100%	31.7	C	
<b>Intersection Total</b>	<b>3,287</b>	<b>3,237</b>	<b>98%</b>	<b>25.8</b>		
<b><u>71. SR58 WB Ramp &amp; Chester Ave</u></b>						

**BAKERSFIELD CENTENNIAL CORRIDOR TRAFFIC OPERATIONS ANALYSIS**  
**YR2038 Alt.C INTERSECTION ANALYSIS RESULTS - PM PEAK**

Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
NB - Chester Ave	879	857	97%	19.0	B	
SB - Chester Ave	1,257	1,236	98%	21.1	C	C
WB - Richland St	705	698	99%	23.9	C	
<b>Intersection Total</b>	<b>2,841</b>	<b>2,791</b>	<b>98%</b>	<b>28.1</b>		
<b><u>72. SR58 EB Ramp &amp; Chester Ave</u></b>						
NB - Chester Ave	1,222	1,221	100%	28.8	C	
SB - Chester Ave	1,309	1,280	98%	12.7	B	C
EB - Frontage Rd	610	569	93%	19.5	B	
<b>Intersection Total</b>	<b>3,141</b>	<b>3,070</b>	<b>98%</b>	<b>21.8</b>		
<b><u>74. Brundage Ln &amp; Union Ave</u></b>						
NB - Union Ave	2,235	2,368	106%	47.4	D	
SB - Union Ave	2,616	2,614	100%	49.5	D	D
EB - Brundage Ln	571	567	99%	54.5	D	
WB - Brundage Ln	1,038	1,084	104%	66.4	E	
<b>Intersection Total</b>	<b>6,460</b>	<b>6,633</b>	<b>103%</b>	<b>51.0</b>		
<b><u>75. Brundage Ln &amp; SR58 WB Ramps (Union Ave)</u></b>						
NB - SR58 WB Off Ramp	675	709	105%	38.9	D	
SB - Liggett St	84	84	100%	48.4	D	D
EB - Brundage Ln	975	957	98%	39.2	D	
WB - Brundage Ln	530	527	99%	48.3	D	
<b>Intersection Total</b>	<b>2,264</b>	<b>2,277</b>	<b>101%</b>	<b>42.6</b>		
<b><u>76. SR58 EB Ramp &amp; Union Ave</u></b>						
NB - Union Ave	2,211	2,207	100%	14.5	B	
SB - Union Ave	1,524	1,603	105%	15.4	B	B
EB - SR58 EB Off Ramp	1,050	1,288	123%	29.2	C	
<b>Intersection Total</b>	<b>4,785</b>	<b>5,098</b>	<b>107%</b>	<b>18.5</b>		
<b><u>77. Cottonwood Rd &amp; Brundage Ln</u></b>						
NB - Cottonwood Rd	1,314	1,305	99%	10.8	B	
SB - Cottonwood Rd	498	499	100%	35.6	D	C
EB - Brundage Ln	374	372	99%	33.5	C	
WB - Brundage Ln	677	689	102%	40.3	D	
<b>Intersection Total</b>	<b>2,863</b>	<b>2,865</b>	<b>100%</b>	<b>25.2</b>		
<b><u>78. Brundage Ln &amp; SR58 WB Ramps (Cottonwood Rd)</u></b>						
NB - SR58 WB Off Ramp	275	253	92%	32.4	C	
SB - Driveway	29	28	97%	29.5	C	D
EB - Brundage Ln	892	887	99%	35.8	D	
WB - Brundage Ln	689	649	94%	30.0	D	
<b>Intersection Total</b>	<b>1,885</b>	<b>1,817</b>	<b>96%</b>	<b>33.9</b>		
<b><u>79. Cottonwood Rd &amp; SR 58 EB Off Ramp</u></b>						

**BAKERSFIELD CENTENNIAL CORRIDOR TRAFFIC OPERATIONS ANALYSIS**  
**YR2038 Alt.C INTERSECTION ANALYSIS RESULTS - PM PEAK**

Location	Demand Volume (vph)	CORSIM Served Volume (vph)	% Served in Model	Control Delay (sec/veh)	LOS (Approach)	LOS (Overall)
NB - Cottonwood Rd	763	759	99%	24.7	C	
SB - Cottonwood Rd	798	817	102%	19.6	B	B
EB - SR-58 EB off Ramp	1,059	1,047	99%	9.1	A	
<i>Intersection Total</i>	<i>2,620</i>	<i>2,623</i>	<i>100%</i>	<i>17.4</i>		



HCM Signalized Intersection Capacity Analysis  
 1: Stockdale Hwy & I-5 SB Off-ramp

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↖	↑↑						↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	
Lane Util. Factor		0.95		1.00	0.95						1.00	
Fr't		0.98		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.95	
Satd. Flow (prot)		3459		1770	3539						1774	
Flt Permitted		1.00		0.62	1.00						0.95	
Satd. Flow (perm)		3459		1146	3539						1774	
Volume (vph)	0	163	29	17	58	0	0	0	0	568	0	1
Peak-hour factor, PHF	0.88	0.88	0.88	0.84	0.84	0.84	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	185	33	20	69	0	0	0	0	617	0	1
RTOR Reduction (vph)	0	28	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	190	0	20	69	0	0	0	0	0	618	0
Turn Type				Perm							Split	
Protected Phases		4				8				6	6	
Permitted Phases				8								
Actuated Green, G (s)		9.4		9.4	9.4						42.6	
Effective Green, g (s)		9.4		9.4	9.4						42.6	
Actuated g/C Ratio		0.16		0.16	0.16						0.71	
Clearance Time (s)		4.0		4.0	4.0						4.0	
Vehicle Extension (s)		3.0		3.0	3.0						3.0	
Lane Grp Cap (vph)		542		180	554						1260	
v/s Ratio Prot		0.06			0.02						0.35	
v/s Ratio Perm				0.02								
v/c Ratio		0.35		0.11	0.12						0.49	
Uniform Delay, d1		22.6		21.7	21.8						3.9	
Progression Factor		1.00		1.23	1.10						1.00	
Incremental Delay, d2		0.4		0.3	0.1						1.4	
Delay (s)		23.0		27.1	24.0						5.2	
Level of Service		C		C	C						A	
Approach Delay (s)		23.0			24.7			0.0			5.2	
Approach LOS		C			C			A			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			11.3			HCM Level of Service					B	
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			60.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			50.3%			ICU Level of Service				A		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 8: Stockdale Highway & Wegis Ave

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1813	1813
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	1813	1813
Volume (vph)	15	1439	20	50	1140	142	10	20	225	153	20	4
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	16	1531	21	53	1213	151	11	23	256	174	23	5
RTOR Reduction (vph)	0	0	4	0	0	10	0	0	40	0	5	0
Lane Group Flow (vph)	16	1531	17	53	1213	141	11	23	216	174	23	0
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			
Actuated Green, G (s)	3.2	52.3	52.3	5.5	54.6	54.6	0.8	22.8	22.8	13.4	35.4	
Effective Green, g (s)	3.2	52.3	52.3	5.5	54.6	54.6	0.8	22.8	22.8	13.4	35.4	
Actuated g/C Ratio	0.03	0.48	0.48	0.05	0.50	0.50	0.01	0.21	0.21	0.12	0.32	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	51	1683	753	89	1757	786	13	386	328	216	583	
v/s Ratio Prot	0.01	0.43		0.03	0.34		0.01	0.01		0.10	0.02	
v/s Ratio Perm			0.01			0.10			0.16			
v/c Ratio	0.31	0.91	0.02	0.60	0.69	0.18	0.85	0.06	0.66	0.81	0.04	
Uniform Delay, d1	52.3	26.7	15.3	51.2	21.2	15.3	54.5	35.0	40.0	47.0	25.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.5	7.6	0.0	10.3	1.2	0.1	166.4	0.3	10.0	19.2	0.1	
Delay (s)	55.8	34.3	15.3	61.4	22.4	15.4	221.0	35.3	50.0	66.3	25.7	
Level of Service	E	C	B	E	C	B	F	D	D	E	C	
Approach Delay (s)		34.3			23.1			55.3			60.7	
Approach LOS		C			C			E			E	

### Intersection Summary

HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		
c: Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 13: Rosedale Hwy & Allen Road

7/26/2012

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.91		0.97	0.91		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.98		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	3433	4759	1524	3213	3167	1468	3273	4837		3183	4921		
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)	3433	4759	1524	3213	3167	1468	3273	4837		3183	4921		
Volume (vph)	138	683	136	375	850	399	220	1144	219	313	1062	132	
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	148	734	146	399	904	424	234	1217	233	333	1130	140	
RTOR Reduction (vph)	0	0	14	0	0	35	0	0	0	0	0	0	
Lane Group Flow (vph)	148	734	132	399	904	389	234	1450	0	333	1270	0	
Heavy Vehicles (%)	2%	9%	6%	9%	14%	10%	7%	4%	8%	10%	3%	9%	
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot			
Protected Phases	5	2		1	6		3	8		7	4		
Permitted Phases			2			6							
Actuated Green, G (s)	6.0	31.1	31.1	12.7	37.8	37.8	9.5	31.0		11.0	32.5		
Effective Green, g (s)	7.3	34.1	34.1	14.0	40.8	40.8	10.4	34.0		11.9	35.5		
Actuated g/C Ratio	0.07	0.31	0.31	0.13	0.37	0.37	0.09	0.31		0.11	0.32		
Clearance Time (s)	5.3	7.0	7.0	5.3	7.0	7.0	4.9	7.0		4.9	7.0		
Vehicle Extension (s)	2.0	6.0	6.0	2.0	5.3	5.3	2.0	3.1		2.0	2.4		
Lane Grp Cap (vph)	228	1475	472	409	1175	544	309	1495		344	1588		
v/s Ratio Prot	0.04	c0.15		c0.12	0.29		0.07	c0.30		c0.10	0.26		
v/s Ratio Perm			0.10			0.29							
v/c Ratio	0.65	0.50	0.28	0.98	0.77	0.72	0.76	0.97		0.97	0.80		
Uniform Delay, d1	50.1	31.0	28.7	47.8	30.5	29.6	48.6	37.5		48.9	34.0		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	4.7	1.2	1.5	37.6	4.9	7.9	9.1	16.4		39.4	2.8		
Delay (s)	54.8	32.2	30.2	85.4	35.3	37.5	57.6	53.9		88.2	36.8		
Level of Service	D	C	C	F	D	D	E	D		F	D		
Approach Delay (s)		35.1			47.4			54.4			47.5		
Approach LOS		D			D			D			D		
<b>Intersection Summary</b>													
HCM Average Control Delay			47.3									HCM Level of Service	D
HCM Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	12.0
Intersection Capacity Utilization			77.7%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

17: Allen Road & San Juan Ave

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↙	↘		↙	↑↑↑	↘	↙	↑↑↑	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	0.91	1.00	1.00	0.91	1.00
Frt		0.96		1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1733		1770	1584		1770	5085	1583	1770	5085	1583
Flt Permitted		0.39		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		701		1229	1584		1770	5085	1583	1770	5085	1583
Volume (vph)	138	1	50	87	1	268	50	1530	78	292	1428	150
Peak-hour factor, PHF	0.88	0.88	0.88	0.90	0.90	0.90	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	157	1	57	97	1	298	53	1628	83	307	1503	158
RTOR Reduction (vph)	0	14	0	0	213	0	0	0	6	0	0	14
Lane Group Flow (vph)	0	201	0	97	86	0	53	1628	77	307	1503	144
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8				2				6
Actuated Green, G (s)		28.5		28.5	28.5		5.6	39.4	39.4	20.1	53.9	53.9
Effective Green, g (s)		28.5		28.5	28.5		5.6	39.4	39.4	20.1	53.9	53.9
Actuated g/C Ratio		0.28		0.28	0.28		0.06	0.39	0.39	0.20	0.54	0.54
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		200		350	451		99	2003	624	356	2741	853
v/s Ratio Prot					0.19		0.03	0.32		0.17	0.30	
v/s Ratio Perm		0.31		0.08					0.05			0.10
w/c Ratio		1.01		0.28	0.19		0.54	0.81	0.12	0.86	0.55	0.17
Uniform Delay, d1		35.8		27.8	27.0		45.9	27.0	19.3	38.6	15.1	11.7
Progression Factor		1.00		1.00	1.00		1.00	0.60	0.51	0.93	0.68	0.65
Incremental Delay, d2		65.5		0.4	0.2		3.4	2.3	0.2	16.7	0.7	0.4
Delay (s)		101.2		28.2	27.2		49.4	15.9	10.1	52.7	11.0	8.0
Level of Service		F		C	C		D	B	B	D	B	A
Approach Delay (s)		101.2			27.5			16.6			17.3	
Approach LOS		F			C			B			B	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 19: Rosedale Hwy & Calloway Drive

7/26/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3367	4673	1509	3155	4550	1429	3019	4638		3242	4940	1455
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3367	4673	1509	3155	4550	1429	3019	4638		3242	4940	1455
Volume (vph)	189	972	223	402	1403	512	289	1331	342	241	1266	160
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94
Adj. Flow (vph)	201	1034	237	423	1477	539	304	1401	360	256	1347	170
RTOR Reduction (vph)	0	0	21	0	0	19	0	0	0	0	0	12
Lane Group Flow (vph)	201	1034	216	423	1477	520	304	1761	0	256	1347	158
Heavy Vehicles (%)	4%	11%	7%	11%	14%	13%	16%	8%	10%	8%	5%	11%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	6.1	35.7	35.7	15.3	44.9	44.9	14.3	44.0		8.6	38.3	38.3
Effective Green, g (s)	8.4	38.6	38.6	17.6	47.8	47.8	16.5	47.0		10.8	41.3	41.3
Actuated g/C Ratio	0.06	0.30	0.30	0.14	0.37	0.37	0.13	0.36		0.08	0.32	0.32
Clearance Time (s)	6.3	6.9	6.9	6.3	6.9	6.9	6.2	7.0		6.2	7.0	7.0
Vehicle Extension (s)	2.0	5.9	5.9	2.0	6.5	6.5	2.0	4.3		2.0	4.3	4.3
Lane Grp Cap (vph)	218	1388	448	427	1673	525	383	1677		269	1569	462
v/s Ratio Prot	0.06	0.22		c0.13	0.32		c0.10	c0.38		0.08	0.27	
v/s Ratio Perm			0.16			0.38						0.12
v/c Ratio	0.92	0.74	0.48	0.99	0.88	0.99	0.79	1.05		0.95	0.86	0.34
Uniform Delay, d1	60.5	41.3	37.5	56.1	38.5	40.9	55.1	41.5		59.3	41.6	33.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	39.4	3.0	2.2	40.9	6.7	36.9	10.1	36.5		41.3	6.3	2.0
Delay (s)	99.9	44.2	39.7	97.0	45.2	77.8	65.2	78.0		100.7	47.9	35.9
Level of Service	F	D	D	F	D	E	E	E		F	D	D
Approach Delay (s)		51.1			61.4			76.1			54.4	
Approach LOS		D			E			E			D	

Intersection Summary

HCM Average Control Delay	61.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 24: Rosedale Hwy & Coffee Road

7/26/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.94	0.91	1.00	0.97	0.91	1.00
Fr't	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3183	4759	1468	3213	4673	1495	4586	4988	1495	3303	4940	1392
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3183	4759	1468	3213	4673	1495	4586	4988	1495	3303	4940	1392
Volume (vph)	162	1379	562	641	1345	318	822	1228	583	193	893	252
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.96	0.96	0.96	0.94	0.94	0.94
Adj. Flow (vph)	171	1452	592	675	1416	335	856	1279	607	205	950	268
RTOR Reduction (vph)	0	0	41	0	0	24	0	0	39	0	0	14
Lane Group Flow (vph)	171	1452	551	675	1416	311	856	1279	568	205	950	254
Heavy Vehicles (%)	10%	9%	10%	9%	11%	8%	11%	4%	8%	6%	5%	16%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	8.3	43.5	43.5	19.7	54.9	54.9	17.8	47.9	47.9	6.9	37.0	37.0
Effective Green, g (s)	10.6	46.5	46.5	22.0	57.9	57.9	20.0	51.4	51.4	9.1	40.5	40.5
Actuated g/C Ratio	0.07	0.32	0.32	0.15	0.40	0.40	0.14	0.35	0.35	0.06	0.28	0.28
Clearance Time (s)	6.3	7.0	7.0	6.3	7.0	7.0	6.2	7.5	7.5	6.2	7.5	7.5
Vehicle Extension (s)	2.0	4.6	4.6	2.0	4.9	4.9	2.0	6.0	6.0	2.0	6.0	6.0
Lane Grp Cap (vph)	233	1526	471	487	1866	597	633	1768	530	207	1380	389
v/s Ratio Prot	0.05	0.31		0.21	0.30		0.19	0.26		0.06	0.19	
v/s Ratio Perm			0.40			0.22			0.41			0.19
v/c Ratio	0.73	0.95	1.17	1.39	0.76	0.52	1.35	0.72	1.07	0.99	0.69	0.65
Uniform Delay, d1	65.8	48.1	49.2	61.5	37.5	33.0	62.5	40.6	46.8	67.9	46.6	46.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.8	13.5	97.3	186.1	2.1	1.5	168.8	2.6	59.9	59.6	2.8	8.2
Delay (s)	75.7	61.6	146.6	247.6	39.7	34.5	231.3	43.2	106.7	127.5	49.4	54.3
Level of Service	E	E	F	F	D	C	F	D	F	F	D	D
Approach Delay (s)		85.4			96.8			116.0			61.6	
Approach LOS		F			F			F			E	

Intersection Summary		
HCM Average Control Delay	94.2	HCM Level of Service
HCM Volume to Capacity ratio	1.27	F
Actuated Cycle Length (s)	145.0	Sum of lost time (s)
Intersection Capacity Utilization	91.2%	16.0
Analysis Period (min)	15	ICU Level of Service
		F

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 29: Stockdale Highway & Coffee Road

7/26/2012

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3433	4988	1495	3367	4940	1495	3433	4989		3400	4988	1553	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3433	4988	1495	3367	4940	1495	3433	4989		3400	4988	1553	
Volume (vph)	678	839	120	287	691	453	207	1699	229	404	1695	362	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	721	893	128	305	735	482	218	1788	241	425	1784	381	
RTOR Reduction (vph)	0	0	15	0	0	29	0	0	0	0	0	19	
Lane Group Flow (vph)	721	893	113	305	735	453	218	2029	0	425	1784	362	
Heavy Vehicles (%)	2%	4%	8%	4%	5%	8%	2%	2%	3%	3%	4%	4%	
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm	
Protected Phases	3	8		7	4		1	6		5	2		
Permitted Phases			8			4						2	
Actuated Green, G (s)	13.0	21.8	21.8	17.2	26.0	26.0	7.0	32.0		9.0	34.0	34.0	
Effective Green, g (s)	13.0	23.8	23.8	17.2	28.0	28.0	7.0	34.0		9.0	36.0	36.0	
Actuated g/C Ratio	0.13	0.24	0.24	0.17	0.28	0.28	0.07	0.34		0.09	0.36	0.36	
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0	
Vehicle Extension (s)	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0		1.0	2.0	2.0	
Lane Grp Cap (vph)	446	1187	356	579	1383	419	240	1696		306	1796	559	
v/s Ratio Prot	c0.21	0.18		0.09	0.15		0.06	c0.41		c0.13	0.36		
v/s Ratio Perm			0.09			0.32						0.25	
v/c Ratio	1.62	0.75	0.32	0.53	0.53	1.08	0.91	1.20		1.39	0.99	0.65	
Uniform Delay, d1	43.5	35.4	31.4	37.7	30.5	36.0	46.2	33.0		45.5	31.9	26.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.08	1.06	1.10	
Incremental Delay, d2	287.7	2.4	0.2	0.4	0.2	67.6	33.6	94.4		189.6	16.9	4.3	
Delay (s)	331.2	37.8	31.6	38.1	30.6	103.6	79.8	127.4		238.7	50.7	33.7	
Level of Service	F	D	C	D	C	F	E	F		F	D	C	
Approach Delay (s)		158.8			55.3			122.8			79.0		
Approach LOS		F			E			F			E		
<b>Intersection Summary</b>													
HCM Average Control Delay			103.9									HCM Level of Service	F
HCM Volume to Capacity ratio			1.21										
Actuated Cycle Length (s)			100.0									Sum of lost time (s)	12.0
Intersection Capacity Utilization			95.5%									ICU Level of Service	F
Analysis Period (min)			15										

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

30: Rosedale Hwy & Mohawk

7/26/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.94	0.91	1.00	0.94	0.91	1.00	0.97	0.91	1.00	
Fr't	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	3155	4940	1429	4627	4803	1429	4757	4803	1417	3273	4803	1455	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	3155	4940	1429	4627	4803	1429	4757	4803	1417	3273	4803	1455	
Volume (vph)	92	1710	850	614	1742	120	478	872	458	194	983	65	
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	
Adj. Flow (vph)	96	1781	885	646	1834	126	503	918	482	209	1057	70	
RTOR Reduction (vph)	0	0	37	0	0	15	0	0	30	0	0	4	
Lane Group Flow (vph)	96	1781	848	646	1834	111	503	918	452	209	1057	66	
Heavy Vehicles (%)	11%	5%	13%	10%	8%	13%	7%	8%	14%	7%	8%	11%	
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm	
Protected Phases	5	2		1	6		3	8		7	4		
Permitted Phases			2			6			8			4	
Actuated Green, G (s)	6.0	43.2	43.2	6.7	43.9	43.9	13.4	39.1	39.1	6.0	31.7	31.7	
Effective Green, g (s)	8.3	45.5	45.5	9.0	46.2	46.2	15.6	41.3	41.3	8.2	33.9	33.9	
Actuated g/C Ratio	0.07	0.38	0.38	0.08	0.39	0.39	0.13	0.34	0.34	0.07	0.28	0.28	
Clearance Time (s)	6.3	6.3	6.3	6.3	6.3	6.3	6.2	6.2	6.2	6.2	6.2	6.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	218	1873	542	347	1849	550	618	1653	488	224	1357	411	
v/s Ratio Prot	0.03	0.36		0.14	0.38		0.11	0.19		0.06	0.22		
v/s Ratio Perm			0.62			0.09			0.34			0.05	
v/c Ratio	0.44	0.95	1.56	1.86	0.99	0.20	0.81	0.56	0.93	0.93	0.78	0.16	
Uniform Delay, d1	53.6	36.2	37.2	55.5	36.7	24.6	50.8	31.9	37.9	55.6	39.6	32.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	12.0	262.7	398.7	19.1	0.8	8.1	0.4	23.8	41.7	2.9	0.2	
Delay (s)	55.0	48.2	300.0	454.2	55.8	25.4	58.9	32.3	61.7	97.3	42.5	32.5	
Level of Service	E	D	F	F	E	C	E	C	E	F	D	C	
Approach Delay (s)		129.1			153.1			46.8			50.6		
Approach LOS		F			F			D			D		
<b>Intersection Summary</b>													
HCM Average Control Delay	106.0		HCM Level of Service					F					
HCM Volume to Capacity ratio	1.34												
Actuated Cycle Length (s)	120.0				Sum of lost time (s)				16.0				
Intersection Capacity Utilization	93.3%		ICU Level of Service					F					
Analysis Period (min)	15												

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 34: Mohawk Street & California Avenue

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↗↖	↖	↗		↗↖	↗↖		↖	↗↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	0.88	0.95	0.95		0.97	0.91		1.00	0.91	1.00
Frts	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1685	2787	1665	1665		3433	5054		1770	4988	1583
Flt Permitted	0.95	0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1685	2787	1665	1665		3433	5054		1770	4988	1583
Volume (vph)	471	98	1061	104	152	61	1053	1182	51	88	1344	631
Peak-hour factor, PHF	0.94	0.94	0.94	0.90	0.90	0.90	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	501	104	1129	116	169	68	1108	1244	54	93	1415	664
RTOR Reduction (vph)	0	0	69	0	0	0	0	0	0	0	0	23
Lane Group Flow (vph)	302	303	1060	116	237	0	1108	1298	0	93	1415	641
Heavy Vehicles (%)	2%	7%	2%	3%	2%	8%	2%	2%	2%	2%	4%	2%
Turn Type	Split	pm+ov		Split			Prot				Prot	Perm
Protected Phases	4	4	5	3	3	5		2			1	6
Permitted Phases	4											6
Actuated Green, G (s)	21.7	21.7	49.5	13.0	13.0	27.8		59.0			8.0	39.2
Effective Green, g (s)	23.0	23.0	50.8	13.0	13.0	27.8		60.0			8.0	40.2
Actuated g/C Ratio	0.19	0.19	0.42	0.11	0.11	0.23		0.50			0.07	0.34
Clearance Time (s)	5.3	5.3	4.0	4.0	4.0	4.0		5.0			4.0	5.0
Vehicle Extension (s)	2.0	2.0	1.0	1.5	1.5	1.0		2.0			1.0	2.0
Lane Grp Cap (vph)	322	323	1273	180	180	795		2527			118	1671
v/s Ratio Prot	0.18	0.18	c0.21	0.07	c0.14	c0.32		0.26			0.05	0.28
v/s Ratio Perm	0.20											0.42
v/c Ratio	0.94	0.94	0.83	0.64	1.32	1.39		0.51			0.79	0.85
Uniform Delay, d1	47.8	47.8	30.8	51.3	53.5	46.1		20.2			55.2	37.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	0.83		0.75			0.79	0.60
Incremental Delay, d2	33.5	33.5	4.6	5.8	176.1	182.5		0.5			20.0	4.0
Delay (s)	81.3	81.3	35.4	57.1	229.6	220.6		15.6			63.5	26.4
Level of Service	F	F	D	E	F	F		B			E	C
Approach Delay (s)	51.4				172.9		110.0				59.8	
Approach LOS	D				F		F				E	

Intersection Summary			
HCM Average Control Delay	81.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 35: Stockdale Highway & California Avenue

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖↗↘		↖↗	↖↗↘	↖	↖↗	↖↗↘		↖↗	↖↗↘	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91	1.00	0.97	0.91		0.97	0.91	1.00
Fr't	1.00	0.97		1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	4896		3273	4759	1583	3400	5019		3303	4893	1495
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	4896		3273	4759	1583	3400	5019		3303	4893	1495
Volume (vph)	594	1137	239	200	1293	169	374	1240	103	328	1522	607
Peak-hour factor, PHF	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	625	1197	252	213	1376	180	398	1319	110	345	1602	639
RTOR Reduction (vph)	0	0	0	0	0	43	0	0	0	0	0	26
Lane Group Flow (vph)	625	1449	0	213	1376	137	398	1429	0	345	1602	613
Heavy Vehicles (%)	2%	3%	4%	7%	9%	2%	3%	2%	4%	6%	6%	8%
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						6
Actuated Green, G (s)	17.0	41.7		8.0	32.7	32.7	12.0	38.7		13.0	39.7	39.7
Effective Green, g (s)	17.0	43.0		8.0	34.0	34.0	12.0	40.0		13.0	41.0	41.0
Actuated g/C Ratio	0.14	0.36		0.07	0.28	0.28	0.10	0.33		0.11	0.34	0.34
Clearance Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3
Vehicle Extension (s)	0.5	2.0		0.5	2.0	2.0	0.5	2.0		0.5	2.0	2.0
Lane Grp Cap (vph)	486	1754		218	1348	449	340	1673		358	1672	511
v/s Ratio Prot	c0.18	0.30		0.07	c0.29		c0.12	0.28		0.10	0.33	
v/s Ratio Perm						0.11						0.43
v/c Ratio	1.29	0.83		0.98	1.02	0.31	1.17	0.85		0.96	0.96	1.20
Uniform Delay, d1	51.5	35.1		55.9	43.0	33.7	54.0	37.3		53.3	38.7	39.5
Progression Factor	1.00	1.00		0.52	0.93	0.99	1.00	1.00		0.77	0.38	0.35
Incremental Delay, d2	143.6	4.6		28.6	19.5	0.6	103.7	5.8		18.8	6.1	96.0
Delay (s)	195.1	39.7		57.7	59.6	34.1	157.7	43.1		59.8	20.9	109.7
Level of Service	F	D		E	E	C	F	D		E	C	F
Approach Delay (s)		86.5			56.8			68.0			48.0	
Approach LOS		F			E			E			D	

### Intersection Summary

HCM Average Control Delay	64.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

44: Empire & Truxtun Ave

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖		↖	↖↖↖		↖	↖		↖	↖↖	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5084		1770	5071		1770	1593		1681	1522	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	5084		1770	5071		1770	1593		1681	1522	
Volume (vph)	51	2291	3	31	2667	52	28	3	91	204	1	155
Peak-hour factor, PHF	0.95	0.95	0.95	0.96	0.96	0.96	0.80	0.80	0.80	0.90	0.90	0.90
Adj. Flow (vph)	54	2412	3	32	2778	54	35	4	114	227	1	172
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	54	2415	0	32	2832	0	35	118	0	211	189	0
Turn Type	Prot			Prot			Split			Split		
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases												
Actuated Green, G (s)	5.7	71.2		2.4	67.9		14.4	14.4		16.0	16.0	
Effective Green, g (s)	5.7	71.2		2.4	67.9		14.4	14.4		16.0	16.0	
Actuated g/C Ratio	0.05	0.59		0.02	0.57		0.12	0.12		0.13	0.13	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	84	3017		35	2869		212	191		224	203	
w/s Ratio Prot	0.03	c0.47		0.02	c0.56		0.02	c0.07		c0.13	0.12	
v/s Ratio Perm												
w/c Ratio	0.64	0.80		0.91	0.99		0.17	0.62		0.94	0.93	
Uniform Delay, d1	56.1	18.9		58.7	25.6		47.4	50.2		51.5	51.5	
Progression Factor	1.00	1.00		0.95	0.70		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.6	1.6		25.5	2.8		1.7	14.1		46.7	47.4	
Delay (s)	71.8	20.5		81.4	20.6		49.1	64.3		98.3	98.8	
Level of Service	E	C		F	C		D	E		F	F	
Approach Delay (s)		21.6			21.3			60.8			98.5	
Approach LOS		C			C			E			F	

## Intersection Summary

HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

# HCM Signalized Intersection Capacity Analysis

50: Stockdale Hwy & Stine Rd

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕	↗		↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frnt	1.00	0.99		1.00	0.99			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)	1770	3406		1770	3380			1807	1568		1795	
Flt Permitted	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (perm)	1770	3406		1770	3380			1807	1568		1795	
Volume (vph)	37	1289	108	363	1305	95	92	87	256	71	164	41
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.90	0.90	0.90	0.88	0.88	0.88
Adj. Flow (vph)	39	1371	115	382	1374	100	102	97	284	81	186	47
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	17	0	0	0
Lane Group Flow (vph)	39	1486	0	382	1474	0	0	199	267	0	314	0
Heavy Vehicles (%)	2%	5%	2%	2%	6%	2%	3%	2%	3%	3%	2%	3%
Turn Type	Prot			Prot			Split		Perm	Split		
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases									3			
Actuated Green, G (s)	3.6	45.8		22.2	64.4			18.5	18.5		18.5	
Effective Green, g (s)	3.1	46.3		21.7	64.9			18.0	18.0		18.0	
Actuated g/C Ratio	0.03	0.39		0.18	0.54			0.15	0.15		0.15	
Clearance Time (s)	3.5	4.5		3.5	4.5			3.5	3.5		3.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	46	1314		320	1828			271	235		269	
v/s Ratio Prot	0.02	c0.44		c0.22	0.44			0.11			c0.17	
v/s Ratio Perm									0.18			
v/c Ratio	0.85	1.13		1.19	0.81			0.73	1.14		1.17	
Uniform Delay, d1	58.2	36.9		49.1	22.4			48.7	51.0		51.0	
Progression Factor	1.10	0.53		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	58.3	65.9		113.8	3.9			9.9	100.3		107.9	
Delay (s)	122.3	85.7		162.9	26.4			58.6	151.3		158.9	
Level of Service	F	F		F	C			E	F		F	
Approach Delay (s)		86.6			54.5			113.1			158.9	
Approach LOS		F			D			F			F	
<b>Intersection Summary</b>												
HCM Average Control Delay		80.8										
HCM Volume to Capacity ratio		1.16										
Actuated Cycle Length (s)		120.0							16.0			
Intersection Capacity Utilization		90.9%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
56: Ming Avenue & New Stine Road

7/26/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		0.97	0.91		0.97	0.91	1.00	0.97	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	4943		3433	5064		3433	5085	1560	3433	4931	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	3433	4943		3433	5064		3433	5085	1560	3433	4931	
Volume (vph)	590	911	187	241	1178	30	70	1129	243	32	1547	349
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95
Adj. Flow (vph)	628	969	199	256	1253	32	74	1201	259	34	1628	367
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	9	0	0	0
Lane Group Flow (vph)	628	1168	0	256	1285	0	74	1201	250	34	1995	0
Confl. Peds. (#/hr)			2			2			2			2
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	22.0	37.6		15.0	30.6		4.7	49.8	49.8	3.5	48.6	
Effective Green, g (s)	22.0	38.9		15.0	31.9		4.7	51.1	51.1	3.5	49.9	
Actuated g/C Ratio	0.18	0.31		0.12	0.26		0.04	0.41	0.41	0.03	0.40	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	0.5	2.0		0.5	2.0		0.5	2.0	2.0	0.5	2.0	
Lane Grp Cap (vph)	607	1544		414	1298		130	2087	640	97	1976	
v/s Ratio Prot	c0.18	0.24		0.07	c0.25		c0.02	0.24		0.01	c0.40	
v/s Ratio Perm									0.17			
v/c Ratio	1.03	0.76		0.62	0.99		0.57	0.58	0.39	0.35	1.01	
Uniform Delay, d1	51.2	38.5		52.0	46.1		58.9	28.3	25.8	59.4	37.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	45.7	3.5		1.9	22.7		3.4	0.2	0.1	0.8	22.6	
Delay (s)	97.0	42.0		54.0	68.8		62.3	28.6	25.9	60.2	59.9	
Level of Service	F	D		D	E		E	C	C	E	E	
Approach Delay (s)		61.3			66.4			29.7			59.9	
Approach LOS		E			E			C			E	
<b>Intersection Summary</b>												
HCM Average Control Delay		55.0										
HCM Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		124.5							16.0			
Intersection Capacity Utilization		88.0%										
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

62: White Lane & Wible Road

7/26/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.90		0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	4982		3400	4988	1546	3433	3539	1546	3433	3539	1560
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	4982		3400	4988	1546	3433	3539	1546	3433	3539	1560
Volume (vph)	123	1805	110	535	1786	295	178	336	602	387	375	173
Peak-hour factor, PHF	0.95	0.95	0.95	0.96	0.96	0.96	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor (vph)	100%	100%	100%	100%	130%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	129	1900	116	557	2419	307	191	361	647	416	403	186
RTOR Reduction (vph)	0	0	0	0	0	39	0	0	76	0	0	8
Lane Group Flow (vph)	129	2016	0	557	2419	268	191	361	571	416	403	178
Confl. Peds. (#/hr)			2			2			2			2
Heavy Vehicles (%)	2%	2%	2%	3%	4%	3%	2%	2%	3%	2%	2%	2%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	5.0	35.3		12.0	42.3	42.3	26.8	34.7	34.7	9.0	16.9	16.9
Effective Green, g (s)	5.0	37.0		12.0	44.0	44.0	26.8	36.0	36.0	9.0	18.2	18.2
Actuated g/C Ratio	0.05	0.34		0.11	0.40	0.40	0.24	0.33	0.33	0.08	0.17	0.17
Clearance Time (s)	4.0	5.7		4.0	5.7	5.7	4.0	5.3	5.3	4.0	5.3	5.3
Vehicle Extension (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lane Grp Cap (vph)	156	1676		371	1995	618	836	1158	506	281	586	258
v/s Ratio Prot	0.04	0.40		c0.16	c0.49		0.06	0.10		c0.12	0.11	
v/s Ratio Perm						0.20			0.42			0.12
v/c Ratio	0.83	1.20		1.50	1.21	0.43	0.23	0.31	1.13	1.48	0.69	0.69
Uniform Delay, d1	52.1	36.5		49.0	33.0	24.0	33.3	27.7	37.0	50.5	43.2	43.2
Progression Factor	1.00	1.00		0.96	1.00	1.03	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.5	97.3		226.9	96.1	0.2	0.1	0.1	80.3	234.4	2.7	6.0
Delay (s)	79.6	133.8		274.0	129.1	24.9	33.4	27.8	117.3	284.9	45.9	49.2
Level of Service	E	F		F	F	C	C	C	F	F	D	D
Approach Delay (s)		130.5			143.9			77.0			145.4	
Approach LOS		F			F			E			F	
<b>Intersection Summary</b>												
HCM Average Control Delay	129.8			HCM Level of Service			F					
HCM Volume to Capacity ratio	1.32											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	95.9%			ICU Level of Service			F					
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
63: White Lane & SR-99 SB Ramps

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗		↑↑↑					↖↖		↖↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0		4.0
Lane Util. Factor		0.86	1.00		0.91					0.97		0.88
Frbp, ped/bikes		1.00	1.00		0.99					1.00		1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00		1.00
Frt		1.00	0.85		0.95					1.00		0.85
Flt Protected		1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)		6346	1583		4787					3433		2760
Flt Permitted		1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)		6346	1583		4787					3433		2760
Volume (vph)	0	2164	630	0	1318	565	0	0	0	723	0	1297
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.93	0.93	0.93	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	150%
Adj. Flow (vph)	0	2254	656	0	1387	595	0	0	0	761	0	2048
RTOR Reduction (vph)	0	0	196	0	70	0	0	0	0	0	0	11
Lane Group Flow (vph)	0	2254	460	0	1912	0	0	0	0	761	0	2037
Confl. Peds. (#/hr)						2						
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	3%
Turn Type		Perm								custom		custom
Protected Phases		2			6					4		
Permitted Phases			2							4		4
Actuated Green, G (s)		44.7	44.7		44.7					53.4		53.4
Effective Green, g (s)		47.0	47.0		47.0					55.0		55.0
Actuated g/C Ratio		0.43	0.43		0.43					0.50		0.50
Clearance Time (s)		6.3	6.3		6.3					5.6		5.6
Vehicle Extension (s)		4.3	4.3		4.9					3.4		3.4
Lane Grp Cap (vph)		2711	676		2045					1717		1380
v/s Ratio Prot		0.36			0.41					0.22		
v/s Ratio Perm			0.41									0.74
v/c Ratio		0.83	0.68		0.93					0.44		1.48
Uniform Delay, d1		28.0	25.4		30.0					17.7		27.5
Progression Factor		1.39	1.96		1.21					1.00		1.00
Incremental Delay, d2		0.3	0.5		6.4					0.2		218.2
Delay (s)		39.2	50.2		42.8					17.9		245.7
Level of Service		D	D		D					B		F
Approach Delay (s)		41.7			42.8			0.0			184.0	
Approach LOS		D			D			A			F	
<b>Intersection Summary</b>												
HCM Average Control Delay		93.9			HCM Level of Service				F			
HCM Volume to Capacity ratio		1.25										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)				8.0			
Intersection Capacity Utilization		112.9%			ICU Level of Service				H			
Analysis Period (min)		15										

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 64: White Lane & SR-99 NB Ramps

7/26/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑		↑↑↑	↑	↑		↑			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.86	0.86		0.91	1.00	1.00		1.00			
Frbp, ped/bikes		1.00	1.00		1.00	0.98	1.00		1.00			
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00		1.00			
Frt		0.96	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		4568	1335		5085	1550	1752		1538			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		4568	1335		5085	1550	1752		1538			
Volume (vph)	0	1252	1635	0	1123	680	760	0	345	0	0	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.95	0.95	0.95	0.93	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	0	1304	1703	0	1182	716	817	0	371	0	0	0
RTOR Reduction (vph)	0	67	0	0	0	0	0	0	15	0	0	0
Lane Group Flow (vph)	0	1779	1161	0	1182	716	817	0	356	0	0	0
Confl. Peds. (#/hr)						2						
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	3%	2%	5%	2%	2%	2%
Turn Type		Free				Free	Prot	custom				
Protected Phases		2				6		8				
Permitted Phases		Free				Free		8				
Actuated Green, G (s)		46.9	110.0			46.9	110.0	53.0	53.0			
Effective Green, g (s)		47.8	110.0			47.8	110.0	54.2	54.2			
Actuated g/C Ratio		0.43	1.00			0.43	1.00	0.49	0.49			
Clearance Time (s)		4.9				4.9		5.2		5.2		
Vehicle Extension (s)		5.7				5.7		5.3		5.3		
Lane Grp Cap (vph)		1985	1335			2210	1550	863	758			
v/s Ratio Prot		0.40				0.23		0.47				
v/s Ratio Perm		0.87				0.46		0.24				
v/c Ratio		0.90	0.87			0.53	0.46	0.95	0.47			
Uniform Delay, d1		28.8	0.0			22.9	0.0	26.5	18.4			
Progression Factor		1.18	1.00			1.39	1.00	1.00	1.00			
Incremental Delay, d2		5.5	4.4			0.4	0.4	19.4	1.1			
Delay (s)		39.5	4.4			32.2	0.4	45.9	19.5			
Level of Service		D	A			C	A	D	B			
Approach Delay (s)		26.0				20.2		37.7		0.0		
Approach LOS		C				C		D		A		
<b>Intersection Summary</b>												
HCM Average Control Delay		26.5			HCM Level of Service				C			
HCM Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)				4.0			
Intersection Capacity Utilization		85.1%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

65: White Lane & Hughes Lane

7/26/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	0.95	1.00	1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4911		1770	5012		1770	3539	1553	1770	3166	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	4911		1770	5012		1770	3539	1553	1770	3166	
Volume (vph)	296	977	258	260	1145	108	244	192	175	192	212	378
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.93	0.93	0.93
Adj. Flow (vph)	315	1039	274	277	1218	115	265	209	190	206	228	406
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	4	0	0	0
Lane Group Flow (vph)	315	1313	0	277	1333	0	265	209	186	206	634	0
Confl. Peds. (#/hr)			2			3			5			3
Turn Type	Prot			Prot			Prot		Perm	Prot		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	20.0	34.9		17.9	32.8		16.0	23.7	23.7	14.9	22.6	
Effective Green, g (s)	20.0	36.2		17.9	34.1		16.0	25.0	25.0	14.9	23.9	
Actuated g/C Ratio	0.18	0.33		0.16	0.31		0.15	0.23	0.23	0.14	0.22	
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	5.3	5.3	4.0	5.3	
Vehicle Extension (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	
Lane Grp Cap (vph)	322	1616		288	1554		257	804	353	240	688	
v/s Ratio Prot	c0.18	c0.27		0.16	0.27		c0.15	0.06		0.12	c0.20	
v/s Ratio Perm									0.12			
v/c Ratio	0.98	0.81		0.96	0.86		1.03	0.26	0.53	0.86	1.20dr	
Uniform Delay, d1	44.8	33.8		45.7	35.7		47.0	34.9	37.3	46.5	42.1	
Progression Factor	1.24	0.62		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	31.7	2.6		42.2	6.4		64.4	0.1	0.7	24.1	17.6	
Delay (s)	87.4	23.6		88.0	42.0		111.4	35.0	38.0	70.6	59.7	
Level of Service	F	C		F	D		F	C	D	E	E	
Approach Delay (s)		35.9			49.9			66.3			62.4	
Approach LOS		D			D			E			E	
<b>Intersection Summary</b>												
HCM Average Control Delay		49.6					HCM Level of Service				D	
HCM Volume to Capacity ratio		0.89										
Actuated Cycle Length (s)		110.0					Sum of lost time (s)			12.0		
Intersection Capacity Utilization		86.1%					ICU Level of Service			E		
Analysis Period (min)		15										
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

69: Ming Avenue & H Street

7/26/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.88		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3282		1736	3259		1703	2995		1770	3471	1500
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3282		1736	3259		1703	2995		1770	3471	1500
Volume (vph)	91	869	136	233	918	40	215	59	196	75	144	147
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.92	0.92	0.90	0.90	0.90
Adj. Flow (vph)	98	934	146	251	987	43	234	64	213	83	160	163
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	12
Lane Group Flow (vph)	98	1080	0	251	1030	0	234	277	0	83	160	151
Confl. Peds. (#/hr)			2			3			2			2
Heavy Vehicles (%)	2%	7%	11%	4%	10%	10%	6%	3%	6%	2%	4%	6%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases		4										6
Actuated Green, G (s)	8.4	41.1		19.0	51.7		17.9	33.5		7.8	23.4	23.4
Effective Green, g (s)	8.4	42.4		19.0	53.0		17.9	34.8		7.8	24.7	24.7
Actuated g/C Ratio	0.07	0.35		0.16	0.44		0.15	0.29		0.06	0.21	0.21
Clearance Time (s)	4.0	5.3		4.0	5.3		4.0	5.3		4.0	5.3	5.3
Vehicle Extension (s)	1.0	4.0		1.0	4.0		1.0	4.0		1.0	4.0	4.0
Lane Grp Cap (vph)	124	1160		275	1439		254	869		115	714	309
v/s Ratio Prot	0.06	c0.33		c0.14	0.32		c0.14	0.09		0.05	0.05	
v/s Ratio Perm												0.11
v/c Ratio	0.79	0.93		0.91	0.72		0.92	0.32		0.72	0.22	0.49
Uniform Delay, d1	54.9	37.4		49.7	27.4		50.4	33.3		55.0	39.7	42.1
Progression Factor	1.00	1.00		0.72	0.36		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	26.5	13.2		20.5	1.0		35.5	1.0		17.1	0.7	5.4
Delay (s)	81.4	50.6		56.0	10.9		85.8	34.3		72.2	40.4	47.5
Level of Service	F	D		E	B		F	C		E	D	D
Approach Delay (s)		53.2			19.7			57.9			49.8	
Approach LOS		D			B			E			D	

Intersection Summary			
HCM Average Control Delay	40.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
73: Ming Avenue & Chester Avenue

7/26/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	3280		1719	3181		1626	3342		1736	3471	1474
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1736	3280		1719	3181		1626	3342		1736	3471	1474
Volume (vph)	303	706	103	140	709	30	175	543	68	52	1027	268
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.94	0.94	0.94
Adj. Flow (vph)	326	759	111	151	762	32	188	584	73	55	1093	285
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	326	870	0	151	794	0	188	657	0	55	1093	271
Confl. Peds. (#/hr)			2			5			4			2
Heavy Vehicles (%)	4%	7%	13%	5%	13%	6%	11%	5%	14%	4%	4%	8%
Turn Type	Prot		Prot		Prot		Prot		Prot		Perm	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases					6							4
Actuated Green, G (s)	21.0	40.1		13.2	32.3		13.8	42.3		6.2	34.7	34.7
Effective Green, g (s)	21.0	41.0		13.2	33.2		13.8	43.6		6.2	36.0	36.0
Actuated g/C Ratio	0.18	0.34		0.11	0.28		0.12	0.36		0.05	0.30	0.30
Clearance Time (s)	4.0	4.9		4.0	4.9		4.0	5.3		4.0	5.3	5.3
Vehicle Extension (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	2.0
Lane Grp Cap (vph)	304	1121		189	880		187	1214		90	1041	442
v/s Ratio Prot	c0.19	0.27		0.09	c0.25		c0.12	0.20		0.03	c0.31	
v/s Ratio Perm												0.19
v/c Ratio	1.07	0.78		0.80	0.90		1.01	0.54		0.61	1.05	0.61
Uniform Delay, d1	49.5	35.4		52.1	41.8		53.1	30.3		55.7	42.0	36.0
Progression Factor	0.78	0.40		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	60.7	3.2		19.3	14.3		67.2	0.3		8.3	42.0	1.8
Delay (s)	99.4	17.2		71.4	56.1		120.3	30.5		64.1	84.0	37.8
Level of Service	F	B		E	E		F	C		E	F	D
Approach Delay (s)		39.6			58.5			50.5			74.0	
Approach LOS		D			E			D			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			56.9			HCM Level of Service		E				
HCM Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)		16.0				
Intersection Capacity Utilization			94.9%			ICU Level of Service		F				
Analysis Period (min)			15									
c Critical Lane Group												



# **STEAM 2.0 MODEL OUTPUT**



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2038 TSM SCENARIO**

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## SCENARIO REPORT

SCENARIO - KERNCOG- 2038 MODEL RUN - TSM SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\2038\_TSM.bsn  
Created - Thursday, January 12, 2012 11:59:53

## SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	9709.1	242.4	0.0	0.0	0.0	0.0	0.0	0.0	9951.4
Improvement Case	9712.6	242.5	0.0	0.0	0.0	0.0	0.0	0.0	9955.1
Change	3.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.7
Person Trips (Million/yr)									
Base Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Improvement Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	388.64	6.15	0.00	1.16	0.00	0.00	0.00	0.00	395.95
Change	-1.46	-0.01	0.00	-0.00	0.00	0.00	0.00	0.00	-1.48
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	388.64	6.15	0.00	1.16	0.00	0.00	0.00	0.00	395.95
Change	-1.46	-0.01	0.00	-0.00	0.00	0.00	0.00	0.00	-1.48
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	6022.2	320.3	0.0	0.0	0.0	0.0	0.0	0.0	6342.6
CO	11376.5	359.3	0.0	0.0	0.0	0.0	0.0	0.0	11735.8
NOX	954.3	634.3	0.0	0.0	0.0	0.0	0.0	0.0	1588.5
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	406.6

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Improvement Case										
HC	6011.6	320.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6331.6
CO	11361.8	359.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11720.9
NOx	953.6	634.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1587.8
PM10	374.7	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	406.8

Change										
HC	-10.6	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-11.0
CO	-14.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-14.9
NOx	-0.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.7
PM10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

Cold Start Emissions (Tons/yr)

Base Case										
HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case										
HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change										
HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emissions (Tons/yr)

Base Case										
HC	7350.4	341.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7691.5
CO	49816.6	962.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50778.7
NOx	1503.4	642.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2146.3
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	406.6

Improvement Case										
HC	7339.7	340.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7680.5
CO	49801.8	962.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50763.8
NOx	1502.7	642.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2145.5
PM10	374.7	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	406.8

Change										
HC	-10.6	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-11.0
CO	-14.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-14.9
NOx	-0.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.7
PM10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

3)EMISSION COSTS

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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## VMT Related Emission Costs (1000\$/yr)

## Base Case

HC	51249.0	2726.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53975.2
CO	1626.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1678.2
NOx	56612.0	37627.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94239.2
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	51158.6	2723.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53881.5
CO	1624.7	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1676.1
NOx	56571.4	37623.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94194.8
PM10	182192.6	15596.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197789.0

## Change

HC	-90.4	-3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-93.6
CO	-2.1	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1
NOx	-40.6	-3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.3
PM10	66.1	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.4

## Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	62551.7	2903.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65455.1
CO	7123.8	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7261.3
NOx	89190.0	38138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127328.0
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	62461.2	2900.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65361.4
CO	7121.7	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7259.2
NOx	89149.4	38134.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127283.7
PM10	182192.6	15596.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197789.0

## Change

HC	-90.4	-3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-93.6
CO	-2.1	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.1
NOx	-40.6	-3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.3
PM10	66.1	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.4

Total Em. Costs(1000\$/yr)	-67.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-65.7
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4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
BTU Energy Consumption(100 Billion BTU/yr)										
Base Case	572.3	45.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	618.2
Improvement Case	571.2	45.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	617.1
Change	-1.1	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.1
CO2 Emissions (1,000 Tons/yr)										
Base Case	4463.6	358.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4821.8
Improvement Case	4455.0	358.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4813.2
Change	-8.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-8.6
Greenhouse Gas Emissions Costs(1000\$/yr)										
Base Case	212242.6	17032.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	229275.0
Improvement Case	211836.2	17029.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	228866.1
Change	-406.4	-2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-408.8

5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Number of Accidents										
Fatalities										
Base Case	66.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.3
Improvement Case	66.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.2
Change	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
Injuries										
Base Case	7237.4	171.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7409.1
Improvement Case	7201.7	171.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7373.1
Change	-35.7	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-36.1
Property-Damage-Only										
Base Case	12045.8	290.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12336.7
Improvement Case	12002.0	290.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12292.5
Change	-43.8	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.2
External Accident Costs										
Fatalities (1000\$/yr)										
Base Case	49199.9	1181.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50381.1
Improvement Case	49166.3	1180.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50346.8
Change	-33.6	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-34.2
Injuries (1000\$/yr)										
Base Case	74979.3	1779.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76758.8

Improvement Case	74609.6	1775.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76385.2
Change	-369.7	-3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-373.5
Property-Damage-Only (1000\$/yr)										
Base Case	18189.1	439.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18628.4
Improvement Case	18123.0	438.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18561.7
Change	-66.1	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-66.7
Total Ext. Acc.(1000\$/yr)	-469.5	-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-474.5
6) FUEL AND NON-FUEL COSTS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Gallons or Gallon Equivalent (1000gal./yr)										
Base Case	457801.8	33109.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	490911.3
Improvement Case	456925.1	33104.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	490030.0
Change	-876.6	-4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-881.3
Energy Costs (1000\$/yr)										
Base Case	1336781.1	115883.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1452664.5
Improvement Case	1334221.3	115867.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1450088.3
Change	-2559.8	-16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2576.2
Non-Fuel Operating Costs (1000\$/yr) *1										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Noise Costs (1000\$/yr)										
Base Case	9709.1	6402.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16111.4
Improvement Case	9712.6	6387.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16100.2
Change	3.5	-14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-11.2
Other Mileage Based External Costs (1000\$/yr)										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)										
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)										
Change										0.0
8) USER BENEFITS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Benefits (1000\$/yr)										
In-Vehicle Travel Time	15862.1	397.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16259.9
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	2559.8	16.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2576.2
Non-Fuel Oper. Costs*2	-197.4	-15.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-213.0

Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	3828.9	28.4	0.0	0.0	0.0	0.0	0.0	0.0	3857.3
Total	22053.4	427.0	0.0	0.0	0.0	0.0	0.0	0.0	22480.4

Revenue Transfers (1000\$/yr)									
Transfers *2	-677.1	-3.0	0.0	0.0	0.0	0.0	0.0	0.0	-680.2

9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL
Capital Cost (1000\$)	294000.0	0.0	0.0	0.0	0.0	294000.0
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0
Annualized Cost (1000\$)	13657.4	0.0	0.0	0.0	0.0	13657.4
Other Op/Maint. Cost (1000\$/yr)						0.0

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	22480.4
Revenue Transfers	-680.2
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	65.7
Global Warming	408.8
Noise	11.2
Accident	474.5
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	551.3
Total Benefits	22760.4

## Costs To Public Agencies (1000\$/yr)

Capital Costs	13657.4
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	13657.4

Net Annual worth (1000\$/yr)	9103.0
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Benefit-Cost Ratio	1.7
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SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\BUILD\2035\_TSM\_DISTRICT.TXT

Output aggregated by districts at points of Production

ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds (minutes)	1 5	2 15	3 20	4 25	5 30	6 40	7 50
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VALUE OF TIME	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-Vehicle (\$/hr.)	10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-Vehicle (\$/hr.)	21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	2.92	3.50
Include Fuel Cost in User Benefits		YES

FUEL TAXES	AUTO	TRUCK	CPOOL
Dollars Per Gallon	0.7724	0.6478	0.7724

NON FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	0.056	0.121
Include Non-Fuel Op. Cost in User Benefits		YES

FUEL CONSUMPTION RATES(g/mile)	AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL (kwhr/Vehicle Mile)	H.RAIL
5 MPH	0.152	0.297	-	-	-	-
10 MPH	0.114	0.265	-	-	-	-
15 MPH	0.088	0.215	-	-	-	-
20 MPH	0.070	0.178	-	-	-	-
25 MPH	0.059	0.159	-	-	-	-
30 MPH	0.051	0.148	-	-	-	-
35 MPH	0.046	0.140	-	-	-	-
40 MPH	0.043	0.134	-	-	-	-
45 MPH	0.041	0.130	-	-	-	-
50 MPH	0.041	0.128	-	-	-	-
55 MPH	0.043	0.128	-	-	-	-
60 MPH	0.046	0.130	-	-	-	-

	0.051	0.134	-	-	-	-
65 MPH Average	-	-	0.377	0.235	11.090	7.630
HC EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.700	4.000	-	-		
10 MPH	1.100	3.140	-	-		
15 MPH	0.900	2.520	-	-		
20 MPH	0.790	2.070	-	-		
25 MPH	0.690	1.730	-	-		
30 MPH	0.620	1.490	-	-		
35 MPH	0.570	1.300	-	-		
40 MPH	0.530	1.170	-	-		
45 MPH	0.490	1.070	-	-		
50 MPH	0.480	1.000	-	-		
55 MPH	0.480	0.960	-	-		
60 MPH	0.510	0.940	-	-		
65 MPH	0.550	0.940	-	-		
Average	-	-	2.520	0.000		
CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.854	5.210	-	-		
10 MPH	1.675	4.226	-	-		
15 MPH	1.509	2.784	-	-		
20 MPH	1.370	1.941	-	-		
25 MPH	1.255	1.613	-	-		
30 MPH	1.158	1.442	-	-		
35 MPH	1.077	1.333	-	-		
40 MPH	1.023	1.271	-	-		
45 MPH	0.963	1.247	-	-		
50 MPH	0.931	1.257	-	-		
55 MPH	0.920	1.301	-	-		
60 MPH	0.937	1.381	-	-		
65 MPH	0.999	1.505	-	-		
Average	-	-	3.210	0.000		
NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	0.159	5.234	-	-		
10 MPH	0.138	4.626	-	-		
15 MPH	0.122	3.666	-	-		
20 MPH	0.109	3.039	-	-		
25 MPH	0.100	2.749	-	-		
30 MPH	0.093	2.565	-	-		
35 MPH	0.088	2.421	-	-		
40 MPH	0.085	2.317	-	-		
45 MPH	0.084	2.253	-	-		
50 MPH	0.084	2.230	-	-		
55 MPH	0.086	2.251	-	-		
60 MPH	0.089	2.321	-	-		
65 MPH	0.094	2.448	-	-		
Average	-	-	16.200	0.000		
PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		

Average	0.035	0.120	0.100	0.000
COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0
EMISSIONS PER COLD START	HC	CO	NOX	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL

1st Highway Class	105.49	105.49	-	-				
2nd Highway Class	83.62	83.62	-	-				
3rd Highway Class	148.57	148.57	-	-				
4th Highway Class	123.65	123.65	-	-				
5th Highway Class	84.91	84.91	-	-				
6th Highway Class	97.32	97.32	-	-				
Average	-	-	3.656	0.000				
NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH		TOTAL	
Capital Costs (1,000\$)	294000	0	0	0	0		294000	
Mid Point Construction	2016	0	0	0	0		-	
Year Opening	2018	0	0	0	0		-	
Useful Life	30	0	0	0	0		-	

			2038_TSM.brp			
salvage value (1,000\$)	0	0	0	0	0	-
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-
Other Operating and Maintenance Costs (1,000\$)						0

MARKET SECTORS - TOTAL # 4

Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	

In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\NOBUILD\2035_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_TSM\BUILD\2035_TSM_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL

Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 4

Name TRANSIT  
 Mode Local Bus  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000  
 Expansion Factor 296.0  
 O/D Trip Split Factor 100.0%  
 Value of Time (\$/hr)  
     In-Vehicle 10.83  
     Out-of-Vehicle 21.66  
 Accessibility index YES  
 Accessibility thresholds YES  
 Speed Equation BPR-Type  
 Run Base Network YES  
 Run Imp. Network YES  
 Ignore Travel Times NO  
 Base Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\NOBUILD\2035\_NB\_NETWORK.TXT  
 Base Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\NOBUILD\2035\_NB\_NETWORK.ttf  
 Imp. Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\BUILD\2035\_TSM\_NETWORK.TXT  
 Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\BUILD\2035\_TSM\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\BUILD\2035\_TSM\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\NOBUILD\2035\_NB\_TRANSIT\_PERSON\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\BUILD\2035\_TSM\_TRANSIT\_PERSON\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## RISK ANALYSIS INPUT VARIABLES

	LOW	HIGH
In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105

Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0
Fatalty Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH	99TH
User Benefit(\$M)	11.22	13.34	14.50	15.70	16.85	17.81	18.84	19.81	21.05	22.57	25.12	27.23	31.35
Emission Costs(\$M)	-2.55	-0.72	-0.47	-0.30	-0.20	-0.14	-0.10	-0.07	-0.03	0.01	0.09	0.18	0.48
Accident Costs(\$M)	-2.62	-1.61	-1.23	-0.90	-0.73	-0.61	-0.52	-0.44	-0.39	-0.32	-0.25	-0.20	-0.13
Noise Costs(\$M)	-0.13	-0.06	-0.04	-0.02	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00
Total Benefits(\$M)	11.63	13.74	14.86	16.32	17.42	18.46	19.42	20.44	21.71	23.24	26.01	28.27	32.36
Total Costs(\$M)	6.75	8.13	9.06	10.59	11.85	13.02	14.39	15.94	18.23	21.47	30.30	42.78	91.17
Benefit Cost Ratio	0.22	0.45	0.63	0.85	1.03	1.20	1.34	1.48	1.67	1.92	2.29	2.69	3.78

RISK OUTPUT(BAR HGHTS)\*3 USER\_BEN EMISS ACCID NOISE TOT\_BEN TOT\_CST BC\_RATIO

Intervals

0 -	0.0055	0.0005	0.0015	0.0010	0.0055	0.0775	0.0135
1 -	0.0070	0.0000	0.0010	0.0000	0.0060	0.1390	0.0190
2 -	0.0100	0.0000	0.0010	0.0005	0.0125	0.1770	0.0175
3 -	0.0140	0.0005	0.0015	0.0000	0.0145	0.1515	0.0220
4 -	0.0195	0.0000	0.0025	0.0010	0.0195	0.1110	0.0285
5 -	0.0195	0.0005	0.0005	0.0000	0.0245	0.0770	0.0420
6 -	0.0340	0.0000	0.0020	0.0010	0.0325	0.0580	0.0415
7 -	0.0440	0.0000	0.0020	0.0010	0.0375	0.0335	0.0485
8 -	0.0415	0.0000	0.0025	0.0010	0.0335	0.0295	0.0535
9 -	0.0425	0.0015	0.0020	0.0035	0.0425	0.0185	0.0490
10 -	0.0455	0.0000	0.0025	0.0020	0.0555	0.0155	0.0530
11 -	0.0510	0.0015	0.0020	0.0020	0.0495	0.0145	0.0600

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12 -	0.0520	0.0020	0.0025	0.0020	0.0495	0.0100	0.0670
13 -	0.0475	0.0005	0.0030	0.0025	0.0465	0.0080	0.0610
14 -	0.0510	0.0025	0.0070	0.0030	0.0580	0.0060	0.0545
15 -	0.0515	0.0030	0.0060	0.0025	0.0545	0.0080	0.0475
16 -	0.0510	0.0020	0.0060	0.0025	0.0475	0.0055	0.0420
17 -	0.0410	0.0010	0.0060	0.0030	0.0425	0.0080	0.0390
18 -	0.0460	0.0015	0.0090	0.0020	0.0380	0.0025	0.0290
19 -	0.0325	0.0025	0.0075	0.0035	0.0445	0.0035	0.0290
20 -	0.0380	0.0050	0.0055	0.0035	0.0315	0.0030	0.0205
21 -	0.0310	0.0030	0.0125	0.0040	0.0360	0.0025	0.0295
22 -	0.0260	0.0065	0.0120	0.0065	0.0205	0.0030	0.0185
23 -	0.0210	0.0035	0.0155	0.0030	0.0180	0.0015	0.0125
24 -	0.0185	0.0100	0.0170	0.0080	0.0260	0.0015	0.0155
25 -	0.0210	0.0140	0.0205	0.0110	0.0155	0.0015	0.0120
26 -	0.0190	0.0155	0.0250	0.0095	0.0165	0.0015	0.0095
27 -	0.0120	0.0325	0.0260	0.0160	0.0140	0.0015	0.0065
28 -	0.0125	0.0340	0.0290	0.0135	0.0155	0.0020	0.0065
29 -	0.0155	0.0655	0.0340	0.0225	0.0145	0.0000	0.0065
30 -	0.0110	0.0825	0.0545	0.0200	0.0090	0.0010	0.0045
31 -	0.0105	0.1380	0.0460	0.0245	0.0075	0.0020	0.0055
32 -	0.0030	0.2080	0.0730	0.0395	0.0080	0.0005	0.0025
33 -	0.0100	0.1890	0.0770	0.0570	0.0055	0.0010	0.0045
34 -	0.0040	0.0720	0.0775	0.0585	0.0105	0.0000	0.0015
35 -	0.0085	0.0405	0.1030	0.0820	0.0075	0.0015	0.0015
36 -	0.0055	0.0225	0.0975	0.1120	0.0020	0.0005	0.0015
37 -	0.0030	0.0100	0.0845	0.1325	0.0025	0.0010	0.0005
38 -	0.0025	0.0045	0.0680	0.1825	0.0030	0.0000	0.0025
39 -	0.0015	0.0045	0.0345	0.1405	0.0020	0.0005	0.0010

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\2038\_TSM.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_TSM\2038\_TSM.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2038 ALTERNATIVE A**

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## SCENARIO REPORT

SCENARIO - KERNCOG- 2038 MODEL RUN - ALTA SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\2038\_ALTA.bsn  
Created - Thursday, January 12, 2012 10:58:30

## SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	9709.1	242.4	0.0	0.0	0.0	0.0	0.0	0.0	9951.4
Improvement Case	9751.1	243.2	0.0	0.0	0.0	0.0	0.0	0.0	9994.3
Change	42.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	42.9
Person Trips (Million/yr)									
Base Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Improvement Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.29	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.57
Change	-5.81	-0.03	0.00	-0.01	0.00	0.00	0.00	0.00	-5.86
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.29	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.57
Change	-5.81	-0.03	0.00	-0.01	0.00	0.00	0.00	0.00	-5.86
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	6022.2	320.3	0.0	0.0	0.0	0.0	0.0	0.0	6342.6
CO	11376.5	359.3	0.0	0.0	0.0	0.0	0.0	0.0	11735.8
NOx	954.3	634.3	0.0	0.0	0.0	0.0	0.0	0.0	1588.5
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	406.6

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Improvement Case

HC	5986.6	319.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6305.7
CO	11332.2	359.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11691.5
NOx	954.3	634.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1589.1
PM10	376.2	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	408.4

Change

HC	-35.6	-1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-36.8
CO	-44.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.3
NOx	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
PM10	1.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7

Cold Start Emissions (Tons/yr)

Base Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emissions (Tons/yr)

Base Case

HC	7350.4	341.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7691.5
CO	49816.6	962.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50778.7
NOx	1503.4	642.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2146.3
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	406.6

Improvement Case

HC	7314.7	340.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7654.7
CO	49772.2	962.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50734.4
NOx	1503.4	643.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2146.9
PM10	376.2	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	408.4

Change

HC	-35.6	-1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-36.8
CO	-44.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.3
NOx	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
PM10	1.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7

3)EMISSION COSTS

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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## VMT Related Emission Costs (1000\$/yr)

## Base Case

HC	51249.0	2726.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53975.2
CO	1626.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1678.2
NOx	56612.0	37627.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94239.2
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	50945.7	2715.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53661.6
CO	1620.5	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1671.9
NOx	56612.6	37660.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94273.3
PM10	182914.9	15643.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198558.8

## Change

HC	-303.3	-10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-313.6
CO	-6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.3
NOx	0.6	33.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.2
PM10	788.4	55.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	844.2

## Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	62551.7	2903.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65455.1
CO	7123.8	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7261.3
NOx	89190.0	38138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127328.0
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	62248.3	2893.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65141.5
CO	7117.4	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7255.0
NOx	89190.6	38171.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127362.2
PM10	182914.9	15643.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198558.8

## Change

HC	-303.3	-10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-313.6
CO	-6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.3
NOx	0.6	33.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.2
PM10	788.4	55.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	844.2

Total Em. Costs(1000\$/yr)	479.3	79.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	558.5
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4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
BTU Energy Consumption(100 Billion BTU/yr)										
Base Case	572.3	45.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	618.2
Improvement Case	569.5	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	615.4
Change	-2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.7
CO2 Emissions (1,000 Tons/yr)										
Base Case	4463.6	358.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4821.8
Improvement Case	4441.9	358.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4800.4
Change	-21.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-21.4
Greenhouse Gas Emissions Costs(1000\$/yr)										
Base Case	212242.6	17032.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	229275.0
Improvement Case	211211.6	17046.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	228258.4
Change	-1031.0	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1016.6

5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Number of Accidents										
Fatalities										
Base Case	66.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.3
Improvement Case	66.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.8
Change	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4
Injuries										
Base Case	7237.4	171.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7409.1
Improvement Case	7179.9	171.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7351.6
Change	-57.4	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-57.5
Property-Damage-Only										
Base Case	12045.8	290.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12336.7
Improvement Case	12009.0	291.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12300.2
Change	-36.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-36.5
External Accident Costs										
Fatalities (1000\$/yr)										
Base Case	49199.9	1181.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50381.1
Improvement Case	48875.4	1183.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50058.5
Change	-324.5	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-322.6
Injuries (1000\$/yr)										
Base Case	74979.3	1779.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76758.8

Improvement Case	74384.2	1778.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76163.0
Change	-595.1	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-595.8
Property-Damage-Only (1000\$/yr)										
Base Case	18189.1	439.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18628.4
Improvement Case	18133.5	439.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18573.3
Change	-55.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-55.1
Total Ext. Acc.(1000\$/yr)	-975.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-973.5
6) FUEL AND NON-FUEL COSTS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER		TOTAL
Gallons or Gallon Equivalent (1000gal./yr)										
Base Case	457801.8	33109.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	490911.3
Improvement Case	455577.9	33137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	488715.5
Change	-2223.8	28.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2195.8
Energy Costs (1000\$/yr)										
Base Case	1336781.1	115883.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1452664.5
Improvement Case	1330287.5	115981.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1446269.2
Change	-6493.6	98.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6395.3
Non-Fuel Operating Costs (1000\$/yr) *1										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER		TOTAL
Noise Costs (1000\$/yr)										
Base Case	9709.1	6402.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16111.4
Improvement Case	9751.1	6401.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16152.1
Change	42.0	-1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.7
Other Mileage Based External Costs (1000\$/yr)										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)										
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)										
Change										0.0
8) USER BENEFITS										
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER		TOTAL
Benefits (1000\$/yr)										
In-Vehicle Travel Time	62940.5	1192.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64133.3
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	6493.6	-98.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6395.3
Non-Fuel Oper. Costs*2	-2353.5	-105.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2458.5

Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	7930.1	-9.9	0.0	0.0	0.0	0.0	0.0	0.0	7920.1
Total	75010.7	979.6	0.0	0.0	0.0	0.0	0.0	0.0	75990.3

Revenue Transfers (1000\$/yr)									
Transfers *2	-1717.7	18.2	0.0	0.0	0.0	0.0	0.0	0.0	-1699.5

9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL
Capital Cost (1000\$)	719000.0	0.0	0.0	0.0	0.0	719000.0
Salvage value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0
Annualized Cost (1000\$)	33400.3	0.0	0.0	0.0	0.0	33400.3
Other Op/Maint. Cost (1000\$/yr)						0.0

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	75990.3
Revenue Transfers	-1699.5
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-558.5
Global Warming	1016.6
Noise	-40.7
Accident	973.5
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	374.3
Total Benefits	75681.7

## Costs To Public Agencies (1000\$/yr)

Capital Costs	33400.3
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	33400.3

Net Annual worth (1000\$/yr)	42281.4
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Benefit-Cost Ratio	2.3
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## SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\BUILD\2035\_ALTA\_DISTRICT.TXT

Output aggregated by districts at points of Production

## ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds (minutes)	1 5	2 15	3 20	4 25	5 30	6 40	7 50
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VALUE OF TIME	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-Vehicle (\$/hr.)	10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-Vehicle (\$/hr.)	21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	2.92	3.50

Include Fuel Cost in User Benefits	YES
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FUEL TAXES	AUTO	TRUCK	CPOOL
Dollars Per Gallon	0.7724	0.6478	0.7724

NON FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	0.056	0.121

Include Non-Fuel Op. Cost in User Benefits	YES
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FUEL CONSUMPTION RATES(g/mile)	AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL (kwhr/Vehicle Mile)	H.RAIL
5 MPH	0.152	0.297	-	-	-	-
10 MPH	0.114	0.265	-	-	-	-
15 MPH	0.088	0.215	-	-	-	-
20 MPH	0.070	0.178	-	-	-	-
25 MPH	0.059	0.159	-	-	-	-
30 MPH	0.051	0.148	-	-	-	-
35 MPH	0.046	0.140	-	-	-	-
40 MPH	0.043	0.134	-	-	-	-
45 MPH	0.041	0.130	-	-	-	-
50 MPH	0.041	0.128	-	-	-	-
55 MPH	0.043	0.128	-	-	-	-
60 MPH	0.046	0.130	-	-	-	-

	0.051	0.134	-	-	-	-
65 MPH Average	-	-	0.377	0.235	11.090	7.630
HC EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.700	4.000	-	-		
10 MPH	1.100	3.140	-	-		
15 MPH	0.900	2.520	-	-		
20 MPH	0.790	2.070	-	-		
25 MPH	0.690	1.730	-	-		
30 MPH	0.620	1.490	-	-		
35 MPH	0.570	1.300	-	-		
40 MPH	0.530	1.170	-	-		
45 MPH	0.490	1.070	-	-		
50 MPH	0.480	1.000	-	-		
55 MPH	0.480	0.960	-	-		
60 MPH	0.510	0.940	-	-		
65 MPH Average	-	-	2.520	0.000		
CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.854	5.210	-	-		
10 MPH	1.675	4.226	-	-		
15 MPH	1.509	2.784	-	-		
20 MPH	1.370	1.941	-	-		
25 MPH	1.255	1.613	-	-		
30 MPH	1.158	1.442	-	-		
35 MPH	1.077	1.333	-	-		
40 MPH	1.023	1.271	-	-		
45 MPH	0.963	1.247	-	-		
50 MPH	0.931	1.257	-	-		
55 MPH	0.920	1.301	-	-		
60 MPH	0.937	1.381	-	-		
65 MPH Average	-	-	3.210	0.000		
NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	0.159	5.234	-	-		
10 MPH	0.138	4.626	-	-		
15 MPH	0.122	3.666	-	-		
20 MPH	0.109	3.039	-	-		
25 MPH	0.100	2.749	-	-		
30 MPH	0.093	2.565	-	-		
35 MPH	0.088	2.421	-	-		
40 MPH	0.085	2.317	-	-		
45 MPH	0.084	2.253	-	-		
50 MPH	0.084	2.230	-	-		
55 MPH	0.086	2.251	-	-		
60 MPH	0.089	2.321	-	-		
65 MPH Average	-	-	16.200	0.000		
PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		

Average	0.035	0.120	0.100	0.000
COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOx	PM10
Average	8510.0	143.0	59325.0	486207.0
EMISSIONS PER COLD START	HC	CO	NOx	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL

1st Highway Class	105.49	105.49	-	-				
2nd Highway Class	83.62	83.62	-	-				
3rd Highway Class	148.57	148.57	-	-				
4th Highway Class	123.65	123.65	-	-				
5th Highway Class	84.91	84.91	-	-				
6th Highway Class	97.32	97.32	-	-				
Average	-	-	3.656	0.000				
NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH		TOTAL	
Capital Costs (1,000\$)	719000	0	0	0	0		719000	
Mid Point Construction	2016	0	0	0	0		-	
Year Opening	2018	0	0	0	0		-	
Useful Life	30	0	0	0	0		-	

Salvage Value (1,000\$)	0	0	0	0	0	-
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-
Other Operating and Maintenance Costs (1,000\$)						0

## MARKET SECTORS - TOTAL # 4

## Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base vehicle occupancy	1.000
Imp. vehicle occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	

In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\NOBUILD\2035_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTA\BUILD\2035_ALTA_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-vehicle Time	NULL

Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 4

Name TRANSIT  
 Mode Local Bus  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000  
 Expansion Factor 296.0  
 O/D Trip Split Factor 100.0%  
 Value of Time (\$/hr)  
     In-Vehicle 10.83  
     Out-of-Vehicle 21.66  
 Accessibility index YES  
 Accessibility thresholds YES  
 Speed Equation BPR-Type  
 Run Base Network YES  
 Run Imp. Network YES  
 Ignore Travel Times NO  
 Base Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\NOBUILD\2035\_NB\_NETWORK.TXT  
 Base Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\NOBUILD\2035\_NB\_NETWORK.ttf  
 Imp. Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\BUILD\2035\_ALTA\_NETWORK.TXT  
 Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\BUILD\2035\_ALTA\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\BUILD\2035\_ALTA\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\NOBUILD\2035\_NB\_TRANSIT\_PERSON\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\BUILD\2035\_ALTA\_TRANSIT\_PERSON\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## RISK ANALYSIS INPUT VARIABLES

	LOW	HIGH
In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105

Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0
Fatalty Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH	99TH
User Benefit(\$M)	39.43	47.26	51.66	56.39	61.04	64.71	68.44	72.45	77.21	83.54	93.47	101.50	115.80
Emission Costs(\$M)	-6.92	-1.36	-0.59	-0.15	0.06	0.25	0.45	0.70	1.00	1.48	2.61	3.70	7.38
Accident Costs(\$M)	-4.66	-3.02	-2.44	-1.82	-1.52	-1.30	-1.12	-0.97	-0.84	-0.71	-0.56	-0.46	-0.31
Noise Costs(\$M)	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.07	0.09	0.15	0.22	0.46
Total Benefits(\$M)	39.39	46.84	50.95	56.46	61.06	64.80	68.20	72.56	77.00	83.62	93.67	102.73	118.23
Total Costs(\$M)	16.50	19.87	22.16	25.90	28.97	31.84	35.18	38.99	44.57	52.50	74.09	104.62	222.97
Benefit Cost Ratio	0.30	0.64	0.91	1.21	1.47	1.71	1.93	2.15	2.41	2.79	3.37	3.98	5.60

RISK OUTPUT(BAR HGHTS)\*3    USER\_BEN    EMISS    ACCID    NOISE    TOT\_BEN    TOT\_CST    BC\_RATIO

Intervals

0 -	0.0060	0.0010	0.0010	0.1405	0.0065	0.0775	0.0140
1 -	0.0065	0.0005	0.0015	0.1845	0.0105	0.1390	0.0185
2 -	0.0090	0.0000	0.0010	0.1305	0.0130	0.1770	0.0180
3 -	0.0170	0.0000	0.0035	0.1130	0.0130	0.1515	0.0265
4 -	0.0185	0.0000	0.0010	0.0815	0.0255	0.1110	0.0310
5 -	0.0205	0.0005	0.0020	0.0585	0.0260	0.0770	0.0415
6 -	0.0350	0.0015	0.0030	0.0565	0.0305	0.0580	0.0480
7 -	0.0365	0.0015	0.0020	0.0395	0.0370	0.0335	0.0460
8 -	0.0460	0.0030	0.0025	0.0250	0.0410	0.0295	0.0585
9 -	0.0380	0.0030	0.0015	0.0195	0.0420	0.0185	0.0505
10 -	0.0445	0.0030	0.0035	0.0225	0.0455	0.0155	0.0625
11 -	0.0450	0.0035	0.0030	0.0130	0.0555	0.0145	0.0575

	2038_ALTA.brp						
12 -	0.0555	0.0045	0.0055	0.0165	0.0490	0.0100	0.0655
13 -	0.0510	0.0060	0.0035	0.0095	0.0555	0.0080	0.0590
14 -	0.0490	0.0060	0.0055	0.0110	0.0555	0.0060	0.0490
15 -	0.0530	0.0120	0.0065	0.0075	0.0480	0.0080	0.0510
16 -	0.0480	0.0220	0.0085	0.0035	0.0445	0.0055	0.0370
17 -	0.0420	0.0440	0.0080	0.0060	0.0430	0.0080	0.0355
18 -	0.0425	0.0835	0.0080	0.0045	0.0445	0.0025	0.0250
19 -	0.0355	0.1830	0.0140	0.0030	0.0380	0.0035	0.0310
20 -	0.0365	0.1760	0.0135	0.0035	0.0300	0.0030	0.0265
21 -	0.0300	0.1145	0.0090	0.0020	0.0275	0.0025	0.0195
22 -	0.0200	0.0890	0.0130	0.0035	0.0210	0.0030	0.0170
23 -	0.0320	0.0500	0.0185	0.0020	0.0235	0.0015	0.0175
24 -	0.0165	0.0355	0.0235	0.0030	0.0205	0.0015	0.0090
25 -	0.0180	0.0290	0.0275	0.0030	0.0170	0.0015	0.0115
26 -	0.0160	0.0235	0.0245	0.0020	0.0160	0.0015	0.0105
27 -	0.0165	0.0195	0.0425	0.0020	0.0145	0.0015	0.0045
28 -	0.0155	0.0175	0.0440	0.0020	0.0130	0.0020	0.0075
29 -	0.0130	0.0090	0.0435	0.0020	0.0125	0.0000	0.0065
30 -	0.0120	0.0080	0.0510	0.0040	0.0120	0.0010	0.0040
31 -	0.0095	0.0065	0.0585	0.0010	0.0075	0.0020	0.0035
32 -	0.0090	0.0045	0.0690	0.0005	0.0065	0.0005	0.0050
33 -	0.0045	0.0050	0.0735	0.0010	0.0085	0.0010	0.0035
34 -	0.0080	0.0040	0.0845	0.0010	0.0045	0.0000	0.0015
35 -	0.0050	0.0015	0.0875	0.0000	0.0080	0.0015	0.0015
36 -	0.0055	0.0015	0.0745	0.0000	0.0060	0.0005	0.0010
37 -	0.0060	0.0025	0.0660	0.0005	0.0025	0.0010	0.0015
38 -	0.0040	0.0025	0.0420	0.0000	0.0040	0.0000	0.0015
39 -	0.0040	0.0025	0.0295	0.0015	0.0010	0.0005	0.0015

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\2038\_ALTA.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTA\2038\_ALTA.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2038 ALTERNATIVE B**

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## SCENARIO REPORT

SCENARIO - KERNCOG- 2038 MODEL RUN - ALTB SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT.B\2038\_ALT.B.SN

Created - Thursday, January 12, 2012 12:26:41

## SCENARIO ANNUAL RESULTS \*\*

1) TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	9709.1	242.4	0.0	0.0	0.0	0.0	0.0	0.0	9951.4
Improvement Case	9760.7	243.3	0.0	0.0	0.0	0.0	0.0	0.0	10004.0
Change	51.6	0.9	0.0	0.0	0.0	0.0	0.0	0.0	52.5
Person Trips (Million/yr)									
Base Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Improvement Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.65	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.93
Change	-5.46	-0.04	0.00	-0.01	0.00	0.00	0.00	0.00	-5.51
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.65	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.93
Change	-5.46	-0.04	0.00	-0.01	0.00	0.00	0.00	0.00	-5.51
2) TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	6022.2	320.3	0.0	0.0	0.0	0.0	0.0	0.0	6342.6
CO	11376.5	359.3	0.0	0.0	0.0	0.0	0.0	0.0	11735.8
NOx	954.3	634.3	0.0	0.0	0.0	0.0	0.0	0.0	1588.5
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	406.6
Improvement Case									

HC	5992.3	319.1	0.0	0.0	0.0	0.0	0.0	0.0	6311.4
CO	11343.3	359.4	0.0	0.0	0.0	0.0	0.0	0.0	11702.7
NOx	955.2	634.9	0.0	0.0	0.0	0.0	0.0	0.0	1590.1
PM10	376.6	32.2	0.0	0.0	0.0	0.0	0.0	0.0	408.8

## Change

HC	-29.9	-1.2	0.0	0.0	0.0	0.0	0.0	0.0	-31.2
CO	-33.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-33.1
NOx	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.5
PM10	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1

## Cold start Emissions (Tons/yr)

## Base Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOx	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emissions (Tons/yr)

## Base Case

HC	7350.4	341.2	0.0	0.0	0.0	0.0	0.0	0.0	7691.5
CO	49816.6	962.1	0.0	0.0	0.0	0.0	0.0	0.0	50778.7
NOx	1503.4	642.9	0.0	0.0	0.0	0.0	0.0	0.0	2146.3
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	406.6

## Improvement Case

HC	7320.4	339.9	0.0	0.0	0.0	0.0	0.0	0.0	7660.4
CO	49783.4	962.2	0.0	0.0	0.0	0.0	0.0	0.0	50745.6
NOx	1504.3	643.5	0.0	0.0	0.0	0.0	0.0	0.0	2147.8
PM10	376.6	32.2	0.0	0.0	0.0	0.0	0.0	0.0	408.8

## Change

HC	-29.9	-1.2	0.0	0.0	0.0	0.0	0.0	0.0	-31.2
CO	-33.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-33.1
NOx	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.5
PM10	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1

## 3)EMISSION COSTS

## VMT Related Emission Costs (1000\$/yr)

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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## 2038\_ALT.B.brp

## Base Case

HC	51249.0	2726.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53975.2
CO	1626.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1678.2
NOx	56612.0	37627.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94239.2
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	50994.4	2715.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53709.9
CO	1622.1	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1673.5
NOx	56666.8	37664.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94331.0
PM10	183094.8	15647.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198742.3

## Change

HC	-254.6	-10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-265.2
CO	-4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.7
NOx	54.8	37.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.8
PM10	968.3	59.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1027.6

## Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	62551.7	2903.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65455.1
CO	7123.8	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7261.3
NOx	89190.0	38138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127328.0
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6

## Improvement Case

HC	62297.0	2892.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65189.8
CO	7119.0	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7256.6
NOx	89244.8	38175.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127419.9
PM10	183094.8	15647.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198742.3

## Change

HC	-254.6	-10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-265.2
CO	-4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.7
NOx	54.8	37.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.8

	PM10		2038_ALT.B.rp						
	968.3	59.3	0.0	0.0	0.0	0.0	0.0	0.0	1027.6
Total Em. Costs(1000\$/yr)	763.7	85.8	0.0	0.0	0.0	0.0	0.0	0.0	849.5
4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
BTU Energy Consumption(100 Billion BTU/yr)									
Base Case	572.3	45.9	0.0	0.0	0.0	0.0	0.0	0.0	618.2
Improvement Case	570.0	46.0	0.0	0.0	0.0	0.0	0.0	0.0	616.0
Change	-2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.2
CO2 Emissions (1,000 Tons/yr)									
Base Case	4463.6	358.2	0.0	0.0	0.0	0.0	0.0	0.0	4821.8
Improvement Case	4446.0	358.5	0.0	0.0	0.0	0.0	0.0	0.0	4804.5
Change	-17.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-17.2
Greenhouse Gas Emissions Costs(1000\$/yr)									
Base Case	212242.6	17032.4	0.0	0.0	0.0	0.0	0.0	0.0	229275.0
Improvement Case	211407.9	17048.1	0.0	0.0	0.0	0.0	0.0	0.0	228456.1
Change	-834.7	15.8	0.0	0.0	0.0	0.0	0.0	0.0	-818.9
5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Number of Accidents									
Fatalities									
Base Case	66.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	68.3
Improvement Case	66.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	67.9
Change	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3
Injuries									
Base Case	7237.4	171.8	0.0	0.0	0.0	0.0	0.0	0.0	7409.1
Improvement Case	7196.1	171.7	0.0	0.0	0.0	0.0	0.0	0.0	7367.8
Change	-41.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	-41.4
Property-Damage-Only									
Base Case	12045.8	290.9	0.0	0.0	0.0	0.0	0.0	0.0	12336.7
Improvement Case	12031.6	291.3	0.0	0.0	0.0	0.0	0.0	0.0	12322.9
Change	-14.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	-13.8
External Accident Costs									
Fatalities (1000\$/yr)									
Base Case	49199.9	1181.2	0.0	0.0	0.0	0.0	0.0	0.0	50381.1
Improvement Case	48952.8	1183.0	0.0	0.0	0.0	0.0	0.0	0.0	50135.8
Change	-247.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	-245.3
Injuries (1000\$/yr)									
Base Case	74979.3	1779.5	0.0	0.0	0.0	0.0	0.0	0.0	76758.8
Improvement Case	74551.4	1778.9	0.0	0.0	0.0	0.0	0.0	0.0	76330.4
Change	-427.9	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	-428.4
Property-Damage-Only (1000\$/yr)									

Base Case	18189.1	439.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18628.4
Improvement Case	18167.8	439.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18607.6
Change	-21.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-20.8
Total Ext. Acc.(1000\$/yr)	-696.3	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-694.5
6) FUEL AND NON-FUEL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Gallons or Gallon Equivalent (1000gal./yr)										
Base Case	457801.8	33109.5	0.0	0.0	0.0	0.0	0.0	0.0	490911.3	
Improvement Case	456001.4	33140.2	0.0	0.0	0.0	0.0	0.0	0.0	489141.6	
Change	-1800.4	30.7	0.0	0.0	0.0	0.0	0.0	0.0	-1769.7	
Energy Costs (1000\$/yr)										
Base Case	1336781.1	115883.4	0.0	0.0	0.0	0.0	0.0	0.0	1452664.5	
Improvement Case	1331524.0	115990.8	0.0	0.0	0.0	0.0	0.0	0.0	1447514.9	
Change	-5257.1	107.5	0.0	0.0	0.0	0.0	0.0	0.0	-5149.7	
Non-Fuel Operating Costs (1000\$/yr) *1										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
7) EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Noise Costs (1000\$/yr)										
Base Case	9709.1	6402.4	0.0	0.0	0.0	0.0	0.0	0.0	16111.4	
Improvement Case	9760.7	6401.4	0.0	0.0	0.0	0.0	0.0	0.0	16162.1	
Change	51.6	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	50.7	
Other Mileage Based External Costs (1000\$/yr)										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Non-Mileage Based External Costs (1000\$/yr)										
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
External Cost During Construction (1000\$/yr)										
Change										0.0
8) USER BENEFITS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Benefits (1000\$/yr)										
In-Vehicle Travel Time	59081.9	1266.9	0.0	0.0	0.0	0.0	0.0	0.0	60348.9	
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fuel Costs *2	5257.1	-107.5	0.0	0.0	0.0	0.0	0.0	0.0	5149.7	
Non-Fuel Oper. Costs*2	-2890.7	-111.6	0.0	0.0	0.0	0.0	0.0	0.0	-3002.3	
Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Intern. Accident Cst.*2	5656.0	-10.4	0.0	0.0	0.0	0.0	0.0	0.0	5645.6	
Total	67104.3	1037.5	0.0	0.0	0.0	0.0	0.0	0.0	68141.8	
Revenue Transfers (1000\$/yr)										

	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	TOTAL
Transfers *2	-1390.6	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1370.7
9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL			
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL						
Capital Cost (1000\$)	630000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	630000.0			
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Annualized Cost (1000\$)	29265.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29265.9			
Other Op/Maint. Cost (1000\$/yr)									0.0			

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	68141.8
Revenue Transfers	-1370.7
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-849.5
Global Warming	818.9
Noise	-50.7
Accident	694.5
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	-205.7
Total Benefits	67384.3
Costs To Public Agencies (1000\$/yr)	
Capital Costs	29265.9
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	29265.9
Net Annual Worth (1000\$/yr)	38118.4
Benefit-Cost Ratio	2.3

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT.B\BUILD\2035\_ALT.B\_DISTRICT.TXT

Output aggregated by districts at points of Production

## ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds (minutes)	1 5	2 15	3 20	4 25	5 30	6 40	7 50
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VALUE OF TIME	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-Vehicle (\$/hr.)	10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-Vehicle (\$/hr.)	21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	2.92	3.50

Include Fuel Cost in User Benefits	YES
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FUEL TAXES	AUTO	TRUCK	CPOOL
Dollars Per Gallon	0.7724	0.6478	0.7724

NON FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	0.056	0.121

Include Non-Fuel Op. Cost in User Benefits	YES
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FUEL CONSUMPTION RATES(g/mile)	AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL (Kwhr/Vehicle Mile)	H.RAIL
5 MPH	0.152	0.297	-	-	-	-
10 MPH	0.114	0.265	-	-	-	-
15 MPH	0.088	0.215	-	-	-	-
20 MPH	0.070	0.178	-	-	-	-
25 MPH	0.059	0.159	-	-	-	-
30 MPH	0.051	0.148	-	-	-	-
35 MPH	0.046	0.140	-	-	-	-
40 MPH	0.043	0.134	-	-	-	-
45 MPH	0.041	0.130	-	-	-	-
50 MPH	0.041	0.128	-	-	-	-
55 MPH	0.043	0.128	-	-	-	-
60 MPH	0.046	0.130	-	-	-	-
65 MPH	0.051	0.134	-	-	-	-
Average	-	-	0.377	0.235	11.090	7.630

HC EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	1.700	4.000	-	-
10 MPH	1.100	3.140	-	-

15 MPH	0.900	2.520	-	-
20 MPH	0.790	2.070	-	-
25 MPH	0.690	1.730	-	-
30 MPH	0.620	1.490	-	-
35 MPH	0.570	1.300	-	-
40 MPH	0.530	1.170	-	-
45 MPH	0.490	1.070	-	-
50 MPH	0.480	1.000	-	-
55 MPH	0.480	0.960	-	-
60 MPH	0.510	0.940	-	-
65 MPH	0.550	0.940	-	-
Average	-	-	2.520	0.000

CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	1.854	5.210	-	-
10 MPH	1.675	4.226	-	-
15 MPH	1.509	2.784	-	-
20 MPH	1.370	1.941	-	-
25 MPH	1.255	1.613	-	-
30 MPH	1.158	1.442	-	-
35 MPH	1.077	1.333	-	-
40 MPH	1.023	1.271	-	-
45 MPH	0.963	1.247	-	-
50 MPH	0.931	1.257	-	-
55 MPH	0.920	1.301	-	-
60 MPH	0.937	1.381	-	-
65 MPH	0.999	1.505	-	-
Average	-	-	3.210	0.000

NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	0.159	5.234	-	-
10 MPH	0.138	4.626	-	-
15 MPH	0.122	3.666	-	-
20 MPH	0.109	3.039	-	-
25 MPH	0.100	2.749	-	-
30 MPH	0.093	2.565	-	-
35 MPH	0.088	2.421	-	-
40 MPH	0.085	2.317	-	-
45 MPH	0.084	2.253	-	-
50 MPH	0.084	2.230	-	-
55 MPH	0.086	2.251	-	-
60 MPH	0.089	2.321	-	-
65 MPH	0.094	2.448	-	-
Average	-	-	16.200	0.000

PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
Average	0.035	0.120	0.100	0.000

COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0

EMISSIONS PER COLD START	HC	CO	NOx	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000

COLD STARTS PER VEHICLE TRIP	STARTS
Auto (starts/trip)	0.60
Truck (starts/trip)	0.60

GREENHOUSE GAS EMIS. RATES	TONS/M.BTU
Auto (CO2 tons/mill.BTU)	0.07800
Truck (CO2 tons/mill.BTU)	0.08000
Bus (CO2 tons/mill.BTU)	0.08000
Rail (CO2 tons/mill.BTU)	0.06400

GREENHOUSE GAS EMIS. COSTS	\$/Ton
CO2 Emissions	47.55

COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO
Internal Accident Cost	4181150	58720	8540
External Accident Cost	737850	10360	1510

FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000

INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000

PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	105.49	105.49	-	-
2nd Highway Class	83.62	83.62	-	-
3rd Highway Class	148.57	148.57	-	-
4th Highway Class	123.65	123.65	-	-
5th Highway Class	84.91	84.91	-	-
6th Highway Class	97.32	97.32	-	-
Average	-	-	3.656	0.000

NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/vehicle Mile	0.000	0.000	0.000	0.000				
\$/vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL		
Capital Costs (1,000\$)	630000	0	0	0	0	630000		
Mid Point Construction	2016	0	0	0	0	-		
Year Opening	2018	0	0	0	0	-		
Useful Life	30	0	0	0	0	-		
Salvage Value (1,000\$)	0	0	0	0	0	-		
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-		
Other Operating and Maintenance Costs (1,000\$)						0		

## Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-vehicle	10.83
Out-of-vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\BUILD\2035_ALT_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\BUILD\2035_ALT_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\BUILD\2035_ALT_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\NOBUILD\2035_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\BUILD\2035_ALT_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-vehicle	10.83
Out-of-vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALT\BUILD\2035_ALT_NETWORK.TXT

## 2038\_ALT.BRP

Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\NOBUILD\2035\_NB\_EXTERNAL\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_EXTERNAL\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 3

Name TRUCKS  
 Mode Truck  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000  
 Expansion Factor 296.0  
 O/D Trip Split Factor 50.0%  
 Value of Time (\$/hr)  
     In-Vehicle 35.37  
     Out-of-Vehicle 19.17  
 Accessibility index YES  
 Accessibility thresholds YES  
 Speed Equation BPR-Type  
 Run Base Network YES  
 Run Imp. Network YES  
 Ignore Travel Times NO  
 Base Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\NOBUILD\2035\_NB\_NETWORK.TXT  
 Base Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\NOBUILD\2035\_NB\_NETWORK.ttf  
 Imp. Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_NETWORK.TXT  
 Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\NOBUILD\2035\_NB\_TRUCK\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT\BUILD\2035\_ALT\_TRUCK\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 4

Name TRANSIT  
 Mode Local Bus  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000

Expansion Factor	296.0
O/D Trip Split Factor	100.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\BUILD\2035_ALTB_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\BUILD\2035_ALTB_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\BUILD\2035_ALTB_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\NOBUILD\2035_NB_TRANSIT_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTB\BUILD\2035_ALTB_TRANSIT_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## RISK ANALYSIS INPUT VARIABLES

LOW HIGH

In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105
Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0

Fatality Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH
99TH												
User Benefit(\$M)	36.33	43.41	47.15	51.95	56.34	60.04	63.65	67.34	71.41	76.73	87.29	94.87
110.71												
Emission Costs(\$M)	-4.25	-0.96	-0.31	0.08	0.32	0.54	0.79	1.10	1.51	2.05	3.30	4.67
9.21												
Accident Costs(\$M)	-3.38	-2.12	-1.66	-1.29	-1.07	-0.90	-0.78	-0.68	-0.58	-0.48	-0.38	-0.32
-0.23												
Noise Costs(\$M)	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.11	0.18	0.26
0.47												
Total Benefits(\$M)	34.09	41.88	46.18	51.12	55.34	59.28	63.09	66.72	70.66	76.12	86.58	93.96
112.51												
Total Costs(\$M)	14.54	17.84	19.76	22.74	25.18	27.89	30.51	33.94	39.32	47.43	65.91	94.24
230.02												
Benefit Cost Ratio	0.28	0.64	0.89	1.23	1.51	1.78	2.03	2.26	2.53	2.92	3.57	4.09
5.33												

RISK OUTPUT(BAR HGHTS)*3	USER_BEN	EMISS	ACCID	NOISE	TOT_BEN	TOT_CST	BC_RATIO
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Intervals

0 -	0.0065	0.0025	0.0005	0.1185	0.0065	0.0935	0.0100
1 -	0.0090	0.0020	0.0010	0.1375	0.0065	0.2030	0.0135
2 -	0.0125	0.0015	0.0025	0.1425	0.0120	0.2000	0.0190
3 -	0.0180	0.0010	0.0015	0.1100	0.0155	0.1410	0.0240
4 -	0.0195	0.0030	0.0010	0.0775	0.0215	0.0900	0.0320
5 -	0.0300	0.0025	0.0020	0.0555	0.0240	0.0570	0.0360
6 -	0.0350	0.0050	0.0020	0.0570	0.0335	0.0455	0.0425
7 -	0.0405	0.0035	0.0005	0.0435	0.0410	0.0285	0.0285
8 -	0.0425	0.0075	0.0020	0.0375	0.0390	0.0235	0.0495
9 -	0.0480	0.0135	0.0030	0.0265	0.0480	0.0150	0.0495
10 -	0.0400	0.0200	0.0030	0.0240	0.0500	0.0120	0.0460
11 -	0.0495	0.0450	0.0035	0.0240	0.0465	0.0165	0.0420
12 -	0.0565	0.0975	0.0025	0.0140	0.0525	0.0060	0.0525
13 -	0.0450	0.1495	0.0070	0.0135	0.0510	0.0045	0.0515
14 -	0.0535	0.1405	0.0040	0.0115	0.0560	0.0055	0.0630
15 -	0.0540	0.1040	0.0045	0.0100	0.0560	0.0065	0.0490
16 -	0.0470	0.0790	0.0085	0.0085	0.0490	0.0045	0.0405
17 -	0.0400	0.0720	0.0065	0.0070	0.0445	0.0025	0.0470

	2038_ALT.BRP						
18 -	0.0485	0.0540	0.0095	0.0060	0.0525	0.0045	0.0390
19 -	0.0395	0.0350	0.0090	0.0055	0.0380	0.0030	0.0285
20 -	0.0330	0.0240	0.0075	0.0040	0.0375	0.0020	0.0280
21 -	0.0295	0.0220	0.0135	0.0040	0.0240	0.0030	0.0260
22 -	0.0210	0.0140	0.0190	0.0060	0.0200	0.0000	0.0205
23 -	0.0235	0.0175	0.0165	0.0030	0.0225	0.0010	0.0195
24 -	0.0195	0.0125	0.0180	0.0040	0.0185	0.0010	0.0125
25 -	0.0115	0.0075	0.0280	0.0060	0.0135	0.0020	0.0205
26 -	0.0115	0.0090	0.0270	0.0020	0.0160	0.0010	0.0175
27 -	0.0175	0.0070	0.0350	0.0035	0.0140	0.0010	0.0110
28 -	0.0130	0.0060	0.0350	0.0020	0.0135	0.0010	0.0140
29 -	0.0120	0.0045	0.0440	0.0010	0.0110	0.0000	0.0065
30 -	0.0080	0.0020	0.0480	0.0010	0.0105	0.0010	0.0065
31 -	0.0110	0.0025	0.0615	0.0015	0.0040	0.0010	0.0060
32 -	0.0060	0.0020	0.0665	0.0025	0.0105	0.0005	0.0060
33 -	0.0070	0.0020	0.0770	0.0025	0.0045	0.0005	0.0035
34 -	0.0045	0.0015	0.0795	0.0010	0.0050	0.0000	0.0045
35 -	0.0035	0.0010	0.0745	0.0025	0.0045	0.0000	0.0055
36 -	0.0045	0.0030	0.0815	0.0010	0.0030	0.0015	0.0025
37 -	0.0045	0.0005	0.0805	0.0000	0.0015	0.0005	0.0020
38 -	0.0030	0.0005	0.0595	0.0020	0.0010	0.0000	0.0035
39 -	0.0010	0.0030	0.0345	0.0010	0.0015	0.0010	0.0005

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT.B\2038\_ALT.B.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALT.B\2038\_ALT.B.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2038 ALTERNATIVE C**

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## SCENARIO REPORT

SCENARIO - KERNCOG- 2038 MODEL RUN - ALTC SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTC9\2038\_ALTC9.bsn

Created - Thursday, January 12, 2012 11:29:53

## SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	9709.1	242.4	0.0	0.0	0.0	0.0	0.0	0.0	9951.4
Improvement Case	9763.4	243.3	0.0	0.0	0.0	0.0	0.0	0.0	10006.8
Change	54.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	55.3
Person Trips (Million/yr)									
Base Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Improvement Case	1388.2	15.1	0.0	6.9	0.0	0.0	0.0	0.0	1410.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.26	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.53
Change	-5.85	-0.04	0.00	-0.02	0.00	0.00	0.00	0.00	-5.91
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	390.10	6.16	0.00	1.17	0.00	0.00	0.00	0.00	397.43
Improvement Case	384.26	6.13	0.00	1.15	0.00	0.00	0.00	0.00	391.53
Change	-5.85	-0.04	0.00	-0.02	0.00	0.00	0.00	0.00	-5.91
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	6022.2	320.3	0.0	0.0	0.0	0.0	0.0	0.0	6342.6
CO	11376.5	359.3	0.0	0.0	0.0	0.0	0.0	0.0	11735.8
NOx	954.3	634.3	0.0	0.0	0.0	0.0	0.0	0.0	1588.5
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	406.6
Improvement Case									

## 2038\_ALTC9.brp

HC	5989.9	319.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6308.9
CO	11340.6	359.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11699.9
NOX	955.1	634.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1589.9
PM10	376.7	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	408.9

## Change

HC	-32.3	-1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-33.6
CO	-35.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-35.9
NOX	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
PM10	2.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2

## Cold Start Emissions (Tons/yr)

## Base Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOX	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	1328.2	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1349.0
CO	38440.1	602.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39042.9
NOX	549.1	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	557.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emissions (Tons/yr)

## Base Case

HC	7350.4	341.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7691.5
CO	49816.6	962.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50778.7
NOX	1503.4	642.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2146.3
PM10	374.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	406.6

## Improvement Case

HC	7318.1	339.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7657.9
CO	49780.7	962.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50742.8
NOX	1504.2	643.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2147.7
PM10	376.7	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	408.9

## Change

HC	-32.3	-1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-33.6
CO	-35.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-35.9
NOX	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
PM10	2.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2

## 3)EMISSION COSTS

## VMT Related Emission Costs (1000\$/yr)

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
------	-------	-------	-------	-------	--------	--------	-------	-------

Base Case										
HC	51249.0	2726.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53975.2
CO	1626.8	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1678.2
NOx	56612.0	37627.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94239.2
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6
Improvement Case										
HC	50974.0	2714.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53688.9
CO	1621.7	51.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1673.1
NOx	56659.1	37663.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94322.1
PM10	183146.2	15649.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198795.6
Change										
HC	-275.0	-11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-286.3
CO	-5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-5.1
NOx	47.1	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.9
PM10	1019.7	61.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1081.0
Cold Start Emission Costs (1000\$/yr)										
Base Case										
HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case										
HC	11302.7	177.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11479.9
CO	5496.9	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5583.1
NOx	32578.0	510.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33088.8
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change										
HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combined VMT and Cold Start Emission Costs (1000\$/yr)										
Base Case										
HC	62551.7	2903.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65455.1
CO	7123.8	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7261.3
NOx	89190.0	38138.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127328.0
PM10	182126.5	15588.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	197714.6
Improvement Case										
HC	62276.6	2892.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65168.8
CO	7118.6	137.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7256.2
NOx	89237.0	38173.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	127410.9
PM10	183146.2	15649.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	198795.6
Change										
HC	-275.0	-11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-286.3
CO	-5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-5.1
NOx	47.1	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.9

2038_ALTC9.brp									
PM10	1019.7	61.3	0.0	0.0	0.0	0.0	0.0	0.0	1081.0
Total Em. Costs(1000\$/yr)	786.6	85.8	0.0	0.0	0.0	0.0	0.0	0.0	872.4
4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
BTU Energy Consumption(100 Billion BTU/yr)									
Base Case	572.3	45.9	0.0	0.0	0.0	0.0	0.0	0.0	618.2
Improvement Case	569.7	46.0	0.0	0.0	0.0	0.0	0.0	0.0	615.6
Change	-2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.5
CO2 Emissions (1,000 Tons/yr)									
Base Case	4463.6	358.2	0.0	0.0	0.0	0.0	0.0	0.0	4821.8
Improvement Case	4443.5	358.5	0.0	0.0	0.0	0.0	0.0	0.0	4802.0
Change	-20.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-19.7
Greenhouse Gas Emissions Costs(1000\$/yr)									
Base Case	212242.6	17032.4	0.0	0.0	0.0	0.0	0.0	0.0	229275.0
Improvement Case	211289.7	17047.6	0.0	0.0	0.0	0.0	0.0	0.0	228337.3
Change	-952.9	15.2	0.0	0.0	0.0	0.0	0.0	0.0	-937.7
5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Number of Accidents									
Fatalities									
Base Case	66.7	1.6	0.0	0.0	0.0	0.0	0.0	0.0	68.3
Improvement Case	66.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	67.9
Change	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4
Injuries									
Base Case	7237.4	171.8	0.0	0.0	0.0	0.0	0.0	0.0	7409.1
Improvement Case	7196.0	171.7	0.0	0.0	0.0	0.0	0.0	0.0	7367.7
Change	-41.4	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-41.5
Property-Damage-Only									
Base Case	12045.8	290.9	0.0	0.0	0.0	0.0	0.0	0.0	12336.7
Improvement Case	12036.1	291.3	0.0	0.0	0.0	0.0	0.0	0.0	12327.4
Change	-9.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	-9.3
External Accident Costs									
Fatalities (1000\$/yr)									
Base Case	49199.9	1181.2	0.0	0.0	0.0	0.0	0.0	0.0	50381.1
Improvement Case	48893.2	1182.5	0.0	0.0	0.0	0.0	0.0	0.0	50075.7
Change	-306.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	-305.4
Injuries (1000\$/yr)									
Base Case	74979.3	1779.5	0.0	0.0	0.0	0.0	0.0	0.0	76758.8
Improvement Case	74550.5	1778.8	0.0	0.0	0.0	0.0	0.0	0.0	76329.3
Change	-428.8	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-429.4
Property-Damage-Only (1000\$/yr)									

Base Case	18189.1	439.3	0.0	0.0	0.0	0.0	0.0	0.0	18628.4
Improvement Case	18174.5	439.9	0.0	0.0	0.0	0.0	0.0	0.0	18614.4
Change	-14.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	-14.0
Total Ext. Acc.(1000\$/yr)	-750.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	-748.8
6) FUEL AND NON-FUEL COSTS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Gallons or Gallon Equivalent (1000gal./yr)									
Base Case	457801.8	33109.5	0.0	0.0	0.0	0.0	0.0	0.0	490911.3
Improvement Case	455746.4	33139.1	0.0	0.0	0.0	0.0	0.0	0.0	488885.5
Change	-2055.4	29.5	0.0	0.0	0.0	0.0	0.0	0.0	-2025.8
Energy Costs (1000\$/yr)									
Base Case	1336781.1	115883.4	0.0	0.0	0.0	0.0	0.0	0.0	1452664.5
Improvement Case	1330779.5	115986.8	0.0	0.0	0.0	0.0	0.0	0.0	1446766.3
Change	-6001.7	103.4	0.0	0.0	0.0	0.0	0.0	0.0	-5898.3
Non-Fuel Operating Costs (1000\$/yr) *1									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Noise Costs (1000\$/yr)									
Base Case	9709.1	6402.4	0.0	0.0	0.0	0.0	0.0	0.0	16111.4
Improvement Case	9763.4	6400.1	0.0	0.0	0.0	0.0	0.0	0.0	16163.6
Change	54.4	-2.2	0.0	0.0	0.0	0.0	0.0	0.0	52.1
Other Mileage Based External Costs (1000\$/yr)									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)									
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)									
Change									0.0
8) USER BENEFITS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Benefits (1000\$/yr)									
In-Vehicle Travel Time	63348.9	1342.3	0.0	0.0	0.0	0.0	0.0	0.0	64691.2
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	6001.7	-103.4	0.0	0.0	0.0	0.0	0.0	0.0	5898.3
Non-Fuel Oper. Costs*2	-3044.2	-115.3	0.0	0.0	0.0	0.0	0.0	0.0	-3159.4
Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	6094.1	-7.1	0.0	0.0	0.0	0.0	0.0	0.0	6087.0
Total	72400.5	1116.5	0.0	0.0	0.0	0.0	0.0	0.0	73517.0
Revenue Transfers (1000\$/yr)									

	Transfers *2								
	-1587.6	19.1	0.0	0.0	0.0	0.0	0.0	0.0	-1568.4
9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL			
Capital Cost (1000\$)	673000.0	0.0	0.0	0.0	0.0	673000.0			
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0			
Annualized Cost (1000\$)	31263.4	0.0	0.0	0.0	0.0	31263.4			
Other Op/Maint. Cost (1000\$/yr)						0.0			

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	73517.0
Revenue Transfers	-1568.4
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-872.4
Global Warming	937.7
Noise	-52.1
Accident	748.8
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	-175.8
Total Benefits	72710.5
Costs To Public Agencies (1000\$/yr)	
Capital Costs	31263.4
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	31263.4
Net Annual Worth (1000\$/yr)	41447.1
Benefit-Cost Ratio	2.3

SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTC9\BUILD\2035\_ALTC9\_DISTRICT.TXT

Output aggregated by districts at points of Production

ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds	1	2	3	4	5	6	7
(minutes)	5	15	20	25	30	40	50

VALUE OF TIME		AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-vehicle (\$/hr.)		10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-vehicle (\$/hr.)		21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS		AUTO	TRUCK
Dollars Per Gallon		2.92	3.50
Include Fuel Cost in User Benefits			YES

FUEL TAXES		AUTO	TRUCK	CPOOL
Dollars Per Gallon		0.7724	0.6478	0.7724

NON FUEL COSTS		AUTO	TRUCK
Dollars Per Gallon		0.056	0.121
Include Non-Fuel Op. Cost in User Benefits			YES

FUEL CONSUMPTION RATES(g/mile)		AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL	H.RAIL
						(kwhr/vehicle Mile)	
5 MPH		0.152	0.297	-	-	-	-
10 MPH		0.114	0.265	-	-	-	-
15 MPH		0.088	0.215	-	-	-	-
20 MPH		0.070	0.178	-	-	-	-
25 MPH		0.059	0.159	-	-	-	-
30 MPH		0.051	0.148	-	-	-	-
35 MPH		0.046	0.140	-	-	-	-
40 MPH		0.043	0.134	-	-	-	-
45 MPH		0.041	0.130	-	-	-	-
50 MPH		0.041	0.128	-	-	-	-
55 MPH		0.043	0.128	-	-	-	-
60 MPH		0.046	0.130	-	-	-	-
65 MPH		0.051	0.134	-	-	-	-
Average		-	-	0.377	0.235	11.090	7.630

HC EMISSION RATES (gr./mile)		AUTO	TRUCK	BUS	RAIL
5 MPH		1.700	4.000	-	-
10 MPH		1.100	3.140	-	-

15 MPH	0.900	2.520	-	-
20 MPH	0.790	2.070	-	-
25 MPH	0.690	1.730	-	-
30 MPH	0.620	1.490	-	-
35 MPH	0.570	1.300	-	-
40 MPH	0.530	1.170	-	-
45 MPH	0.490	1.070	-	-
50 MPH	0.480	1.000	-	-
55 MPH	0.480	0.960	-	-
60 MPH	0.510	0.940	-	-
65 MPH	0.550	0.940	-	-
Average	-	-	2.520	0.000

CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	1.854	5.210	-	-
10 MPH	1.675	4.226	-	-
15 MPH	1.509	2.784	-	-
20 MPH	1.370	1.941	-	-
25 MPH	1.255	1.613	-	-
30 MPH	1.158	1.442	-	-
35 MPH	1.077	1.333	-	-
40 MPH	1.023	1.271	-	-
45 MPH	0.963	1.247	-	-
50 MPH	0.931	1.257	-	-
55 MPH	0.920	1.301	-	-
60 MPH	0.937	1.381	-	-
65 MPH	0.999	1.505	-	-
Average	-	-	3.210	0.000

NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	0.159	5.234	-	-
10 MPH	0.138	4.626	-	-
15 MPH	0.122	3.666	-	-
20 MPH	0.109	3.039	-	-
25 MPH	0.100	2.749	-	-
30 MPH	0.093	2.565	-	-
35 MPH	0.088	2.421	-	-
40 MPH	0.085	2.317	-	-
45 MPH	0.084	2.253	-	-
50 MPH	0.084	2.230	-	-
55 MPH	0.086	2.251	-	-
60 MPH	0.089	2.321	-	-
65 MPH	0.094	2.448	-	-
Average	-	-	16.200	0.000

PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
Average	0.035	0.120	0.100	0.000

COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0

EMISSIONS PER COLD START	HC	CO	NOX	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	105.49	105.49	-	-
2nd Highway Class	83.62	83.62	-	-
3rd Highway Class	148.57	148.57	-	-
4th Highway Class	123.65	123.65	-	-
5th Highway Class	84.91	84.91	-	-
6th Highway Class	97.32	97.32	-	-
Average	-	-	3.656	0.000

NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL		
Capital Costs (1,000\$)	673000	0	0	0	0	673000		
Mid Point Construction	2016	0	0	0	0	-		
Year Opening	2018	0	0	0	0	-		
Useful Life	30	0	0	0	0	-		
Salvage Value (1,000\$)	0	0	0	0	0	-		
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-		
Other Operating and Maintenance Costs (1,000\$)						0		

## Market Sector # 1

Name	AUTO
Mode	Auto
Base vehicle occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-vehicle	10.83
Out-of-vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-vehicle	10.83
Out-of-vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.TXT

Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 4

Name	TRANSIT
Mode	Local Bus
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000

Expansion Factor	296.0
O/D Trip Split Factor	100.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\NOBUILD\2035_NB_TRANSIT_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2038_ALTC9\BUILD\2035_ALTC9_TRANSIT_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## RISK ANALYSIS INPUT VARIABLES

LOW HIGH

In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105
Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0

Fatality Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH
99TH												
User Benefit(\$M)	40.47	47.44	51.38	56.21	60.34	64.00	68.36	72.73	77.42	83.39	92.75	101.43
118.73												
Emission Costs(\$M)	-7.31	-1.40	-0.40	0.04	0.31	0.53	0.78	1.08	1.51	2.25	3.69	5.41
11.56												
Accident Costs(\$M)	-3.35	-2.26	-1.81	-1.41	-1.17	-1.01	-0.88	-0.74	-0.63	-0.53	-0.42	-0.34
-0.25												
Noise Costs(\$M)	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.11	0.18	0.28
0.50												
Total Benefits(\$M)	38.26	45.95	49.96	55.05	59.27	63.31	67.42	72.05	77.07	83.07	92.38	100.90
118.96												
Total Costs(\$M)	15.64	19.26	21.39	24.56	27.21	30.02	33.33	37.26	41.79	49.90	70.92	95.43
191.51												
Benefit Cost Ratio	0.28	0.68	0.92	1.25	1.54	1.76	2.01	2.25	2.54	2.91	3.47	4.03
5.29												

RISK OUTPUT(BAR HGHTS)\*3    USER\_BEN    EMISS    ACCID    NOISE    TOT\_BEN    TOT\_CST    BC\_RATIO

Intervals

0 -	0.0065	0.0005	0.0025	0.1320	0.0090	0.0565	0.0085
1 -	0.0125	0.0010	0.0015	0.1540	0.0090	0.1295	0.0105
2 -	0.0125	0.0010	0.0015	0.1480	0.0100	0.1590	0.0180
3 -	0.0185	0.0000	0.0010	0.0925	0.0165	0.1425	0.0245
4 -	0.0245	0.0005	0.0015	0.0790	0.0260	0.1105	0.0255
5 -	0.0295	0.0010	0.0010	0.0660	0.0230	0.0970	0.0360
6 -	0.0370	0.0020	0.0025	0.0475	0.0330	0.0660	0.0375
7 -	0.0455	0.0030	0.0030	0.0390	0.0465	0.0370	0.0365
8 -	0.0515	0.0050	0.0025	0.0380	0.0460	0.0280	0.0425
9 -	0.0425	0.0040	0.0055	0.0230	0.0505	0.0195	0.0480
10 -	0.0515	0.0070	0.0035	0.0260	0.0465	0.0205	0.0615
11 -	0.0570	0.0100	0.0035	0.0160	0.0520	0.0175	0.0535
12 -	0.0510	0.0090	0.0070	0.0160	0.0545	0.0155	0.0535
13 -	0.0385	0.0215	0.0035	0.0140	0.0525	0.0125	0.0530
14 -	0.0440	0.0525	0.0055	0.0110	0.0445	0.0085	0.0485
15 -	0.0465	0.1425	0.0070	0.0060	0.0400	0.0080	0.0485
16 -	0.0435	0.2040	0.0075	0.0055	0.0410	0.0070	0.0400
17 -	0.0440	0.1475	0.0090	0.0100	0.0500	0.0040	0.0420

	2038_ALTC9.brp							
18 -	0.0360	0.1010	0.0070	0.0070	0.0320	0.0060	0.0345	
19 -	0.0350	0.0625	0.0160	0.0035	0.0375	0.0045	0.0370	
20 -	0.0360	0.0420	0.0120	0.0035	0.0360	0.0040	0.0320	
21 -	0.0285	0.0395	0.0195	0.0030	0.0305	0.0020	0.0270	
22 -	0.0285	0.0250	0.0205	0.0060	0.0250	0.0040	0.0300	
23 -	0.0230	0.0185	0.0190	0.0025	0.0275	0.0020	0.0170	
24 -	0.0175	0.0195	0.0275	0.0035	0.0225	0.0025	0.0180	
25 -	0.0205	0.0085	0.0275	0.0035	0.0175	0.0025	0.0155	
26 -	0.0130	0.0120	0.0295	0.0020	0.0115	0.0020	0.0110	
27 -	0.0115	0.0080	0.0395	0.0065	0.0125	0.0010	0.0120	
28 -	0.0130	0.0065	0.0415	0.0030	0.0170	0.0010	0.0115	
29 -	0.0125	0.0040	0.0485	0.0020	0.0085	0.0005	0.0085	
30 -	0.0080	0.0035	0.0530	0.0010	0.0110	0.0005	0.0065	
31 -	0.0095	0.0025	0.0625	0.0015	0.0095	0.0010	0.0055	
32 -	0.0070	0.0030	0.0670	0.0020	0.0040	0.0020	0.0035	
33 -	0.0035	0.0050	0.0560	0.0015	0.0045	0.0015	0.0045	
34 -	0.0055	0.0015	0.0665	0.0010	0.0065	0.0005	0.0030	
35 -	0.0045	0.0015	0.0885	0.0010	0.0045	0.0005	0.0045	
36 -	0.0035	0.0025	0.0690	0.0015	0.0040	0.0010	0.0035	
37 -	0.0035	0.0005	0.0630	0.0000	0.0040	0.0015	0.0025	
38 -	0.0025	0.0005	0.0450	0.0005	0.0020	0.0000	0.0025	
39 -	0.0010	0.0005	0.0330	0.0005	0.0015	0.0010	0.0020	

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTC9\2038\_ALTC9.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2038\_ALTC9\2038\_ALTC9.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2018 TSM SCENARIO**

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FEDERAL HIGHWAY ADMINISTRATION  
SURFACE TRANSPORTATION EFFICIENCY ANALYSIS MODEL (STEAM) version 2.0.1

## SCENARIO REPORT

SCENARIO - KERNCOG- 2018 MODEL RUN - TSM SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_TSM\2018\_TSM.bsn  
Created - Thursday, January 12, 2012 14:49:23

## SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	5974.6	167.7	0.0	0.0	0.0	0.0	0.0	0.0	6142.3
Improvement Case	5978.4	167.8	0.0	0.0	0.0	0.0	0.0	0.0	6146.2
Change	3.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.9
Person Trips (Million/yr)									
Base Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Improvement Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	244.94	4.42	0.00	0.81	0.00	0.00	0.00	0.00	250.17
Change	-1.91	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	-1.93
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	244.94	4.42	0.00	0.81	0.00	0.00	0.00	0.00	250.17
Change	-1.91	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	-1.93
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	3763.8	228.0	0.0	0.0	0.0	0.0	0.0	0.0	3991.8
CO	7082.0	249.9	0.0	0.0	0.0	0.0	0.0	0.0	7331.9
NOx	592.1	442.2	0.0	0.0	0.0	0.0	0.0	0.0	1034.3
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7
Improvement Case									

HC	3749.7	227.6	0.0	0.0	0.0	0.0	0.0	0.0	3977.3
CO	7062.3	249.7	0.0	0.0	0.0	0.0	0.0	0.0	7312.0
NOx	591.1	442.1	0.0	0.0	0.0	0.0	0.0	0.0	1033.2
PM10	230.7	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.8
Change									
HC	-14.1	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	-14.5
CO	-19.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-19.9
NOx	-1.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-1.1
PM10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

Cold Start Emissions (Tons/yr)

Base Case

HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case

HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emissions (Tons/yr)

Base Case

HC	4698.3	243.3	0.0	0.0	0.0	0.0	0.0	0.0	4941.6
CO	34128.9	690.5	0.0	0.0	0.0	0.0	0.0	0.0	34819.4
NOx	978.5	448.5	0.0	0.0	0.0	0.0	0.0	0.0	1427.0
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7

Improvement Case

HC	4684.2	242.9	0.0	0.0	0.0	0.0	0.0	0.0	4927.0
CO	34109.2	690.3	0.0	0.0	0.0	0.0	0.0	0.0	34799.5
NOx	977.4	448.4	0.0	0.0	0.0	0.0	0.0	0.0	1425.9
PM10	230.7	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.8

Change

HC	-14.1	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	-14.5
CO	-19.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-19.9
NOx	-1.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-1.1
PM10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

3)EMISSION COSTS

VMT Related Emission Costs (1000\$/yr)

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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## 2018\_TSM.brp

## Base Case

HC	32029.8	1940.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33970.5
CO	1012.7	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1048.5
NOx	35126.1	26235.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61361.2
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

## Improvement Case

HC	31909.6	1937.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33846.9
CO	1009.9	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1045.6
NOx	35064.2	26230.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61294.6
PM10	112144.9	10791.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122936.3

## Change

HC	-120.2	-3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-123.6
CO	-2.8	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.8
NOx	-61.9	-4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-66.6
PM10	70.5	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.4

## Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emission Costs (1000\$/yr)

## Base Case

HC	39982.5	2070.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42052.7
CO	4880.4	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.2
NOx	58048.3	26608.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84656.9
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

## Improvement Case

HC	39862.3	2066.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41929.1
CO	4877.6	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4976.3
NOx	57986.4	26603.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84590.3
PM10	112144.9	10791.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122936.3

## Change

HC	-120.2	-3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-123.6
CO	-2.8	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.8
NOx	-61.9	-4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-66.6

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PM10	70.5	8.0	0.0	0.0	0.0	0.0	0.0	0.0	78.4
Total Em. Costs(1000\$/yr)	-114.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-114.6
4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
BTU Energy Consumption(100 Billion BTU/yr)									
Base Case	358.5	32.1	0.0	0.0	0.0	0.0	0.0	0.0	390.5
Improvement Case	356.9	32.1	0.0	0.0	0.0	0.0	0.0	0.0	389.0
Change	-1.5	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.6
CO2 Emissions (1,000 Tons/yr)									
Base Case	2796.0	250.1	0.0	0.0	0.0	0.0	0.0	0.0	3046.1
Improvement Case	2783.9	250.0	0.0	0.0	0.0	0.0	0.0	0.0	3034.0
Change	-12.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-12.1
Greenhouse Gas Emissions Costs(1000\$/yr)									
Base Case	132950.9	11891.9	0.0	0.0	0.0	0.0	0.0	0.0	144842.8
Improvement Case	132376.4	11889.0	0.0	0.0	0.0	0.0	0.0	0.0	144265.4
Change	-574.5	-2.9	0.0	0.0	0.0	0.0	0.0	0.0	-577.4
5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Number of Accidents									
Fatalities									
Base Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	43.0
Improvement Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	42.9
Change	-0.1	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Injuries									
Base Case	4507.3	123.7	0.0	0.0	0.0	0.0	0.0	0.0	4631.0
Improvement Case	4435.5	123.1	0.0	0.0	0.0	0.0	0.0	0.0	4558.6
Change	-71.8	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-72.4
Property-Damage-Only									
Base Case	7449.9	205.4	0.0	0.0	0.0	0.0	0.0	0.0	7655.3
Improvement Case	7357.8	204.7	0.0	0.0	0.0	0.0	0.0	0.0	7562.5
Change	-92.1	-0.7	0.0	0.0	0.0	0.0	0.0	0.0	-92.8
External Accident Costs									
Fatalities (1000\$/yr)									
Base Case	30870.5	859.6	0.0	0.0	0.0	0.0	0.0	0.0	31730.1
Improvement Case	30831.6	859.0	0.0	0.0	0.0	0.0	0.0	0.0	31690.6
Change	-38.9	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-39.5
Injuries (1000\$/yr)									
Base Case	46695.2	1281.5	0.0	0.0	0.0	0.0	0.0	0.0	47976.7
Improvement Case	45951.6	1275.5	0.0	0.0	0.0	0.0	0.0	0.0	47227.1
Change	-743.6	-6.0	0.0	0.0	0.0	0.0	0.0	0.0	-749.6
Property-Damage-Only (1000\$/yr)									

Base Case	11249.3	310.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11559.5
Improvement Case	11110.2	309.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11419.3
Change	-139.1	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-140.1
Total Ext. Acc.(1000\$/yr)	-921.6	-7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-929.3
6) FUEL AND NON-FUEL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Gallons or Gallon Equivalent (1000gal./yr)										
Base Case	286771.6	23117.0	0.0	0.0	0.0	0.0	0.0	0.0	309888.6	
Improvement Case	285532.5	23111.3	0.0	0.0	0.0	0.0	0.0	0.0	308643.8	
Change	-1239.1	-5.7	0.0	0.0	0.0	0.0	0.0	0.0	-1244.8	
Energy Costs (1000\$/yr)										
Base Case	837373.1	80909.4	0.0	0.0	0.0	0.0	0.0	0.0	918282.6	
Improvement Case	833755.0	80889.4	0.0	0.0	0.0	0.0	0.0	0.0	914644.4	
Change	-3618.2	-20.0	0.0	0.0	0.0	0.0	0.0	0.0	-3638.2	
Non-Fuel Operating Costs (1000\$/yr) *1										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Noise Costs (1000\$/yr)										
Base Case	5974.6	4659.1	0.0	0.0	0.0	0.0	0.0	0.0	10633.7	
Improvement Case	5978.4	4638.7	0.0	0.0	0.0	0.0	0.0	0.0	10617.0	
Change	3.8	-20.4	0.0	0.0	0.0	0.0	0.0	0.0	-16.7	
Other Mileage Based External Costs (1000\$/yr)										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)										
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)										
Change										0.0
8) USER BENEFITS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Benefits (1000\$/yr)										
In-Vehicle Travel Time	20682.5	403.9	0.0	0.0	0.0	0.0	0.0	0.0	21086.4	
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	3618.2	20.0	0.0	0.0	0.0	0.0	0.0	0.0	3638.2	
Non-Fuel Oper. Costs*2	-210.4	-15.0	0.0	0.0	0.0	0.0	0.0	0.0	-225.3	
Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	7519.8	43.2	0.0	0.0	0.0	0.0	0.0	0.0	7563.0	
Total	31610.1	452.1	0.0	0.0	0.0	0.0	0.0	0.0	32062.2	
Revenue Transfers (1000\$/yr)										

Transfers *2	-957.1	-3.7	0.0	0.0	0.0	0.0	0.0	0.0	-960.8
9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL			
Capital Cost (1000\$)	294000.0	0.0	0.0	0.0	0.0	294000.0			
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0			
Annualized Cost (1000\$)	13657.4	0.0	0.0	0.0	0.0	13657.4			
Other Op/Maint. Cost (1000\$/yr)						0.0			

11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	32062.2
Revenue Transfers	-960.8
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	114.6
Global warming	577.4
Noise	16.7
Accident	929.3
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	1060.5
Total Benefits	32739.4
Costs To Public Agencies (1000\$/yr)	
Capital Costs	13657.4
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	13657.4
Net Annual worth (1000\$/yr)	19082.0
Benefit-Cost Ratio	2.4

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_TSM\BUILD\2015\_TSM\_DISTRICT.TXT

Output aggregated by districts at points of Production

ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds	1	2	3	4	5	6	7
(minutes)	5	15	20	25	30	40	50

VALUE OF TIME		AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-Vehicle (\$/hr.)		10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-Vehicle (\$/hr.)		21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS		AUTO	TRUCK
Dollars Per Gallon		2.92	3.50
Include Fuel Cost in User Benefits			YES

FUEL TAXES		AUTO	TRUCK	CPOOL
Dollars Per Gallon		0.7724	0.6478	0.7724

NON FUEL COSTS		AUTO	TRUCK
Dollars Per Gallon		0.056	0.121
Include Non-Fuel Op. Cost in User Benefits			YES

FUEL CONSUMPTION RATES(g/mile)		AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL	H.RAIL
						(kwhr/vehicle Mile)	
5 MPH		0.152	0.297	-	-	-	-
10 MPH		0.114	0.265	-	-	-	-
15 MPH		0.088	0.215	-	-	-	-
20 MPH		0.070	0.178	-	-	-	-
25 MPH		0.059	0.159	-	-	-	-
30 MPH		0.051	0.148	-	-	-	-
35 MPH		0.046	0.140	-	-	-	-
40 MPH		0.043	0.134	-	-	-	-
45 MPH		0.041	0.130	-	-	-	-
50 MPH		0.041	0.128	-	-	-	-
55 MPH		0.043	0.128	-	-	-	-
60 MPH		0.046	0.130	-	-	-	-
65 MPH		0.051	0.134	-	-	-	-
Average		-	-	0.377	0.235	11.090	7.630

HC EMISSION RATES (gr./mile)		AUTO	TRUCK	BUS	RAIL
5 MPH		1.700	4.000	-	-
10 MPH		1.100	3.140	-	-

15 MPH	0.900	2.520	-	-
20 MPH	0.790	2.070	-	-
25 MPH	0.690	1.730	-	-
30 MPH	0.620	1.490	-	-
35 MPH	0.570	1.300	-	-
40 MPH	0.530	1.170	-	-
45 MPH	0.490	1.070	-	-
50 MPH	0.480	1.000	-	-
55 MPH	0.480	0.960	-	-
60 MPH	0.510	0.940	-	-
65 MPH	0.550	0.940	-	-
Average	-	-	2.520	0.000

CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	1.854	5.210	-	-
10 MPH	1.675	4.226	-	-
15 MPH	1.509	2.784	-	-
20 MPH	1.370	1.941	-	-
25 MPH	1.255	1.613	-	-
30 MPH	1.158	1.442	-	-
35 MPH	1.077	1.333	-	-
40 MPH	1.023	1.271	-	-
45 MPH	0.963	1.247	-	-
50 MPH	0.931	1.257	-	-
55 MPH	0.920	1.301	-	-
60 MPH	0.937	1.381	-	-
65 MPH	0.999	1.505	-	-
Average	-	-	3.210	0.000

NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	0.159	5.234	-	-
10 MPH	0.138	4.626	-	-
15 MPH	0.122	3.666	-	-
20 MPH	0.109	3.039	-	-
25 MPH	0.100	2.749	-	-
30 MPH	0.093	2.565	-	-
35 MPH	0.088	2.421	-	-
40 MPH	0.085	2.317	-	-
45 MPH	0.084	2.253	-	-
50 MPH	0.084	2.230	-	-
55 MPH	0.086	2.251	-	-
60 MPH	0.089	2.321	-	-
65 MPH	0.094	2.448	-	-
Average	-	-	16.200	0.000

PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
Average	0.035	0.120	0.100	0.000

COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0

EMISSIONS PER COLD START	HC	CO	NOx	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP STARTS				
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES TONS/M.BTU				
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS \$/Ton				
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident) FATAL INJURY PDO				
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT) AUTO TRUCK BUS RAIL				
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT) AUTO TRUCK BUS RAIL				
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT) AUTO TRUCK BUS RAIL				
1st Highway Class	105.49	105.49	-	-
2nd Highway Class	83.62	83.62	-	-
3rd Highway Class	148.57	148.57	-	-
4th Highway Class	123.65	123.65	-	-
5th Highway Class	84.91	84.91	-	-
6th Highway Class	97.32	97.32	-	-
Average	-	-	3.656	0.000

NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL		
Capital Costs (1,000\$)	294000	0	0	0	0	294000		
Mid Point Construction	2016	0	0	0	0	-		
Year Opening	2018	0	0	0	0	-		
Useful Life	30	0	0	0	0	-		
Salvage Value (1,000\$)	0	0	0	0	0	-		
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-		
Other Operating and Maintenance Costs (1,000\$)						0		

## Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.TXT

Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 4

Name	TRANSIT
Mode	Local Bus
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000

Expansion Factor	296.0
O/D Trip Split Factor	100.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\NOBUILD\2015_NB_TRANSIT_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_TSM\BUILD\2015_TSM_TRANSIT_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## RISK ANALYSIS INPUT VARIABLES

LOW HIGH

In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105
Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0

Fatality Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH
99TH												
User Benefit(\$M)	15.40	17.84	19.26	20.85	22.24	23.58	24.90	26.33	27.86	30.02	33.03	36.05
42.11 Emission Costs(\$M)	-5.03	-1.21	-0.72	-0.43	-0.31	-0.22	-0.16	-0.11	-0.07	-0.02	0.08	0.19
0.66 Accident Costs(\$M)	-5.20	-3.12	-2.36	-1.74	-1.43	-1.18	-1.00	-0.85	-0.74	-0.61	-0.47	-0.38
-0.27 Noise Costs(\$M)	-0.16	-0.09	-0.06	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.00	-0.00
-0.00 Total Benefits(\$M)	16.25	18.70	20.22	22.03	23.41	24.73	26.12	27.62	29.28	31.37	34.79	37.33
44.79 Total Costs(\$M)	6.83	8.41	9.34	10.73	11.89	13.12	14.56	16.28	18.25	21.80	30.98	41.69
83.66 Benefit Cost Ratio	0.26	0.62	0.83	1.14	1.39	1.58	1.78	2.00	2.25	2.56	3.01	3.50
4.47												

RISK OUTPUT(BAR HGHTS)\*3 USER\_BEN EMISS ACCID NOISE TOT\_BEN TOT\_CST BC\_RATIO

Intervals

0 -	0.0100	0.0005	0.0015	0.0010	0.0110	0.0565	0.0075
1 -	0.0090	0.0000	0.0000	0.0000	0.0095	0.1295	0.0105
2 -	0.0120	0.0005	0.0010	0.0005	0.0115	0.1590	0.0135
3 -	0.0165	0.0000	0.0005	0.0020	0.0190	0.1425	0.0245
4 -	0.0245	0.0000	0.0010	0.0000	0.0230	0.1105	0.0265
5 -	0.0225	0.0000	0.0005	0.0015	0.0315	0.0970	0.0260
6 -	0.0405	0.0010	0.0020	0.0010	0.0355	0.0660	0.0330
7 -	0.0460	0.0000	0.0040	0.0030	0.0435	0.0370	0.0350
8 -	0.0495	0.0005	0.0010	0.0005	0.0530	0.0280	0.0385
9 -	0.0440	0.0000	0.0020	0.0025	0.0495	0.0195	0.0445
10 -	0.0550	0.0000	0.0005	0.0010	0.0515	0.0205	0.0460
11 -	0.0525	0.0005	0.0040	0.0040	0.0585	0.0175	0.0585
12 -	0.0520	0.0010	0.0045	0.0060	0.0565	0.0155	0.0495
13 -	0.0470	0.0005	0.0030	0.0025	0.0460	0.0125	0.0550
14 -	0.0440	0.0015	0.0035	0.0035	0.0455	0.0085	0.0535
15 -	0.0475	0.0010	0.0035	0.0025	0.0480	0.0080	0.0455
16 -	0.0460	0.0025	0.0080	0.0040	0.0415	0.0070	0.0470
17 -	0.0425	0.0000	0.0055	0.0055	0.0435	0.0040	0.0415

	2018_TSM.brp							
18 -	0.0375	0.0005	0.0050	0.0030	0.0385	0.0060	0.0400	
19 -	0.0335	0.0010	0.0080	0.0025	0.0330	0.0045	0.0345	
20 -	0.0335	0.0055	0.0100	0.0055	0.0355	0.0040	0.0335	
21 -	0.0295	0.0015	0.0055	0.0080	0.0235	0.0020	0.0335	
22 -	0.0290	0.0025	0.0145	0.0085	0.0255	0.0040	0.0275	
23 -	0.0240	0.0050	0.0140	0.0055	0.0170	0.0020	0.0255	
24 -	0.0180	0.0065	0.0170	0.0080	0.0200	0.0025	0.0230	
25 -	0.0175	0.0030	0.0245	0.0085	0.0200	0.0025	0.0155	
26 -	0.0115	0.0075	0.0185	0.0145	0.0165	0.0020	0.0100	
27 -	0.0155	0.0100	0.0240	0.0165	0.0130	0.0010	0.0145	
28 -	0.0110	0.0155	0.0340	0.0185	0.0145	0.0010	0.0095	
29 -	0.0100	0.0175	0.0460	0.0235	0.0090	0.0005	0.0105	
30 -	0.0105	0.0280	0.0420	0.0240	0.0045	0.0005	0.0095	
31 -	0.0090	0.0495	0.0475	0.0375	0.0055	0.0010	0.0070	
32 -	0.0050	0.0990	0.0570	0.0405	0.0065	0.0020	0.0045	
33 -	0.0055	0.1690	0.0725	0.0480	0.0055	0.0015	0.0050	
34 -	0.0065	0.2990	0.0805	0.0665	0.0045	0.0005	0.0075	
35 -	0.0040	0.1695	0.1035	0.0785	0.0020	0.0005	0.0015	
36 -	0.0035	0.0515	0.0950	0.0960	0.0025	0.0010	0.0030	
37 -	0.0025	0.0190	0.0980	0.1445	0.0025	0.0015	0.0015	
38 -	0.0010	0.0070	0.0700	0.1545	0.0010	0.0000	0.0045	
39 -	0.0010	0.0035	0.0470	0.1270	0.0015	0.0005	0.0030	

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_TSM\2018\_TSM.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_TSM\2018\_TSM.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2018 ALTERNATIVE A**

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SCENARIO REPORT

SCENARIO - KERNCOG- 2018 MODEL RUN - ALTA SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\2018\_ALTA.bsn  
Created - Thursday, January 12, 2012 14:16:28

SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	5974.6	167.7	0.0	0.0	0.0	0.0	0.0	0.0	6142.3
Improvement Case	5996.5	167.9	0.0	0.0	0.0	0.0	0.0	0.0	6164.5
Change	21.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	22.2
Person Trips (Million/yr)									
Base Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Improvement Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	245.99	4.43	0.00	0.82	0.00	0.00	0.00	0.00	251.24
Change	-0.86	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.86
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	245.99	4.43	0.00	0.82	0.00	0.00	0.00	0.00	251.24
Change	-0.86	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.86
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	3763.8	228.0	0.0	0.0	0.0	0.0	0.0	0.0	3991.8
CO	7082.0	249.9	0.0	0.0	0.0	0.0	0.0	0.0	7331.9
NOx	592.1	442.2	0.0	0.0	0.0	0.0	0.0	0.0	1034.3
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7

2018\_ALTA.brp

Improvement Case										
HC	3762.8	228.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3990.8
CO	7085.8	250.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7335.8
NOx	593.3	442.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1035.9
PM10	231.4	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	253.6

Change										
HC	-1.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
CO	3.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9
NOx	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
PM10	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9

Cold Start Emissions (Tons/yr)

Base Case										
HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case										
HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change										
HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emissions (Tons/yr)

Base Case										
HC	4698.3	243.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4941.6
CO	34128.9	690.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34819.4
NOx	978.5	448.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1427.0
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	252.7

Improvement Case										
HC	4697.3	243.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4940.6
CO	34132.6	690.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34823.3
NOx	979.7	448.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1428.6
PM10	231.4	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	253.6

Change										
HC	-1.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0
CO	3.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9
NOx	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
PM10	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9

3)EMISSION COSTS

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
------	-------	-------	-------	-------	--------	--------	-------	-------

VMT Related Emission Costs (1000\$/yr)

Base Case

HC	32029.8	1940.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33970.5
CO	1012.7	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1048.5
NOx	35126.1	26235.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61361.2
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	32021.7	1940.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33961.9
CO	1013.3	35.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1049.0
NOx	35199.2	26257.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61456.5
PM10	112485.5	10799.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123285.0

Change

HC	-8.2	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-8.5
CO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
NOx	73.1	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.3
PM10	411.2	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	427.2

Cold Start Emission Costs (1000\$/yr)

Base Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emission Costs (1000\$/yr)

Base Case

HC	39982.5	2070.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42052.7
CO	4880.4	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.2
NOx	58048.3	26608.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84656.9
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	39974.4	2069.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42044.2
CO	4881.0	98.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.7
NOx	58121.5	26630.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84752.2
PM10	112485.5	10799.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123285.0

Change

HC	-8.2	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	-8.5
CO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
NOX	73.1	22.2	0.0	0.0	0.0	0.0	0.0	0.0	95.3
PM10	411.2	16.0	0.0	0.0	0.0	0.0	0.0	0.0	427.2

Total Em. Costs(1000\$/yr)	476.7	37.8	0.0	0.0	0.0	0.0	0.0	0.0	514.5
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4)GREENHOUSE GAS EMISSIONS

	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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BTU Energy Consumption(100 Billion BTU/yr)

Base Case	358.5	32.1	0.0	0.0	0.0	0.0	0.0	0.0	390.5
Improvement Case	358.6	32.1	0.0	0.0	0.0	0.0	0.0	0.0	390.7
Change	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

CO2 Emissions (1,000 Tons/yr)

Base Case	2796.0	250.1	0.0	0.0	0.0	0.0	0.0	0.0	3046.1
Improvement Case	2797.0	250.3	0.0	0.0	0.0	0.0	0.0	0.0	3047.3
Change	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2

Greenhouse Gas Emissions Costs(1000\$/yr)

Base Case	132950.9	11891.9	0.0	0.0	0.0	0.0	0.0	0.0	144842.8
Improvement Case	132997.5	11901.7	0.0	0.0	0.0	0.0	0.0	0.0	144899.2
Change	46.6	9.7	0.0	0.0	0.0	0.0	0.0	0.0	56.3

5)ACCIDENTS

	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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Number of Accidents

Fatalities

Base Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	43.0
Improvement Case	41.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	43.1
Change	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

Injuries

Base Case	4507.3	123.7	0.0	0.0	0.0	0.0	0.0	0.0	4631.0
Improvement Case	4502.9	123.7	0.0	0.0	0.0	0.0	0.0	0.0	4626.7
Change	-4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.3

Property-Damage-Only

Base Case	7449.9	205.4	0.0	0.0	0.0	0.0	0.0	0.0	7655.3
Improvement Case	7453.5	205.5	0.0	0.0	0.0	0.0	0.0	0.0	7659.1
Change	3.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.8

External Accident Costs

Fatalities (1000\$/yr)

Base Case	30870.5	859.6	0.0	0.0	0.0	0.0	0.0	0.0	31730.1
Improvement Case	30917.6	860.4	0.0	0.0	0.0	0.0	0.0	0.0	31778.0
Change	47.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	47.9

Injuries (1000\$/yr)

Base Case	46695.2	1281.5	0.0	0.0	0.0	0.0	0.0	0.0	47976.7
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Improvement Case	46650.5	1281.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47932.4
Change	-44.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-44.3
Property-Damage-Only (1000\$/yr)										
Base Case	11249.3	310.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11559.5
Improvement Case	11254.9	310.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11565.2
Change	5.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7
Total Ext. Acc.(1000\$/yr)	7.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4
6) FUEL AND NON-FUEL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Gallons or Gallon Equivalent (1000gal./yr)										
Base Case	286771.6	23117.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	309888.6
Improvement Case	286872.1	23135.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310008.0
Change	100.5	18.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	119.4
Energy Costs (1000\$/yr)										
Base Case	837373.1	80909.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	918282.6
Improvement Case	837666.6	80975.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	918642.3
Change	293.5	66.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	359.7
Non-Fuel Operating Costs (1000\$/yr) *1										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Noise Costs (1000\$/yr)										
Base Case	5974.6	4659.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10633.7
Improvement Case	5996.5	4661.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10658.2
Change	21.9	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5
Other Mileage Based External Costs (1000\$/yr)										
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)										
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)										
Change										0.0
8) USER BENEFITS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Benefits (1000\$/yr)										
In-Vehicle Travel Time	9302.2	76.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9378.6
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	-293.5	-66.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-359.7
Non-Fuel Oper. Costs*2	-1227.4	-30.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1257.5

Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	-74.8	-8.0	0.0	0.0	0.0	0.0	0.0	0.0	-82.9
Total	7706.5	-28.0	0.0	0.0	0.0	0.0	0.0	0.0	7678.5

Revenue Transfers (1000\$/yr)									
Transfers *2	77.6	12.3	0.0	0.0	0.0	0.0	0.0	0.0	89.9

9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL
Capital Cost (1000\$)	719000.0	0.0	0.0	0.0	0.0	719000.0
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0
Annualized Cost (1000\$)	33400.3	0.0	0.0	0.0	0.0	33400.3
Other Op/Maint. Cost (1000\$/yr)						0.0

11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	7678.5
Revenue Transfers	89.9
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-514.5
Global Warming	-56.3
Noise	-24.5
Accident	-9.4
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	-548.4
Total Benefits	7163.7

Costs To Public Agencies (1000\$/yr)	
Capital Costs	33400.3
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	33400.3

Net Annual worth (1000\$/yr) -26236.6

Benefit-Cost Ratio 0.2

SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\BUILD\2015\_ALTA\_DISTRICT.TXT

Output aggregated by districts at points of Production

ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds	1	2	3	4	5	6	7
(minutes)	5	15	20	25	30	40	50

VALUE OF TIME		AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-vehicle (\$/hr.)		10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-vehicle (\$/hr.)		21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS		AUTO	TRUCK	
Dollars Per Gallon		2.92	3.50	
Include Fuel Cost in User Benefits				YES

FUEL TAXES		AUTO	TRUCK	CPOOL
Dollars Per Gallon		0.7724	0.6478	0.7724

NON FUEL COSTS		AUTO	TRUCK	
Dollars Per Gallon		0.056	0.121	
Include Non-Fuel Op. Cost in User Benefits				YES

FUEL CONSUMPTION RATES(g/mile)		AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL	H.RAIL
						(kwhr/vehicle mile)	
5 MPH		0.152	0.297	-	-	-	-
10 MPH		0.114	0.265	-	-	-	-
15 MPH		0.088	0.215	-	-	-	-
20 MPH		0.070	0.178	-	-	-	-
25 MPH		0.059	0.159	-	-	-	-
30 MPH		0.051	0.148	-	-	-	-
35 MPH		0.046	0.140	-	-	-	-
40 MPH		0.043	0.134	-	-	-	-
45 MPH		0.041	0.130	-	-	-	-
50 MPH		0.041	0.128	-	-	-	-
55 MPH		0.043	0.128	-	-	-	-
60 MPH		0.046	0.130	-	-	-	-

	AUTO	TRUCK	BUS	RAIL
65 MPH	0.051	0.134	-	-
Average	-	-	0.377	0.235
HC EMISSION RATES (gr./mile)				
5 MPH	1.700	4.000	-	-
10 MPH	1.100	3.140	-	-
15 MPH	0.900	2.520	-	-
20 MPH	0.790	2.070	-	-
25 MPH	0.690	1.730	-	-
30 MPH	0.620	1.490	-	-
35 MPH	0.570	1.300	-	-
40 MPH	0.530	1.170	-	-
45 MPH	0.490	1.070	-	-
50 MPH	0.480	1.000	-	-
55 MPH	0.480	0.960	-	-
60 MPH	0.510	0.940	-	-
65 MPH	0.550	0.940	-	-
Average	-	-	2.520	0.000
CO EMISSION RATES (gr./mile)				
5 MPH	1.854	5.210	-	-
10 MPH	1.675	4.226	-	-
15 MPH	1.509	2.784	-	-
20 MPH	1.370	1.941	-	-
25 MPH	1.255	1.613	-	-
30 MPH	1.158	1.442	-	-
35 MPH	1.077	1.333	-	-
40 MPH	1.023	1.271	-	-
45 MPH	0.963	1.247	-	-
50 MPH	0.931	1.257	-	-
55 MPH	0.920	1.301	-	-
60 MPH	0.937	1.381	-	-
65 MPH	0.999	1.505	-	-
Average	-	-	3.210	0.000
NO EMISSION RATES (gr./mile)				
5 MPH	0.159	5.234	-	-
10 MPH	0.138	4.626	-	-
15 MPH	0.122	3.666	-	-
20 MPH	0.109	3.039	-	-
25 MPH	0.100	2.749	-	-
30 MPH	0.093	2.565	-	-
35 MPH	0.088	2.421	-	-
40 MPH	0.085	2.317	-	-
45 MPH	0.084	2.253	-	-
50 MPH	0.084	2.230	-	-
55 MPH	0.086	2.251	-	-
60 MPH	0.089	2.321	-	-
65 MPH	0.094	2.448	-	-
Average	-	-	16.200	0.000
PM10 EMISSION RATES (gr./mile)				
	AUTO	TRUCK	BUS	RAIL

Average	0.035	0.120	0.100	0.000
COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0
EMISSIONS PER COLD START	HC	CO	NOX	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL

1st Highway Class	105.49	105.49	-	-				
2nd Highway Class	83.62	83.62	-	-				
3rd Highway Class	148.57	148.57	-	-				
4th Highway Class	123.65	123.65	-	-				
5th Highway Class	84.91	84.91	-	-				
6th Highway Class	97.32	97.32	-	-				
Average	-	-	3.656	0.000				
NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH		TOTAL	
Capital Costs (1,000\$)	719000	0	0	0	0		719000	
Mid Point Construction	2016	0	0	0	0		-	
Year Opening	2018	0	0	0	0		-	
Useful Life	30	0	0	0	0		-	

	2018_ALTA.brp					
Salvage Value (1,000\$)	0	0	0	0	0	-
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-
Other Operating and Maintenance Costs (1,000\$)						0

MARKET SECTORS - TOTAL # 4

Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	

In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\NOBUILD\2015_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTA\BUILD\2015_ALTA_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL

Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 4

Name TRANSIT  
 Mode Local Bus  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000  
 Expansion Factor 296.0  
 O/D Trip Split Factor 100.0%  
 Value of Time (\$/hr)  
     In-Vehicle 10.83  
     Out-of-Vehicle 21.66  
 Accessibility index YES  
 Accessibility thresholds YES  
 Speed Equation BPR-Type  
 Run Base Network YES  
 Run Imp. Network YES  
 Ignore Travel Times NO  
 Base Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\NOBUILD\2015\_NB\_NETWORK.TXT  
 Base Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\NOBUILD\2015\_NB\_NETWORK.ttf  
 Imp. Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\BUILD\2015\_ALTA\_NETWORK.TXT  
 Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\BUILD\2015\_ALTA\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\BUILD\2015\_ALTA\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\NOBUILD\2015\_NB\_TRANSIT\_PERSON\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\BUILD\2015\_ALTA\_TRANSIT\_PERSON\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## RISK ANALYSIS INPUT VARIABLES

	LOW	HIGH
In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105

Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0
Fatalty Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH	99TH
User Benefit(\$M)	3.28	4.35	5.01	5.76	6.52	7.13	7.76	8.35	9.12	10.02	11.32	12.53	14.78
Emission Costs(\$M)	0.10	0.16	0.21	0.31	0.40	0.50	0.61	0.75	0.96	1.28	1.87	2.57	5.04
Accident Costs(\$M)	-0.22	-0.12	-0.07	-0.03	-0.01	0.00	0.01	0.02	0.04	0.06	0.09	0.13	0.24
Noise Costs(\$M)	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.08	0.13	0.24
Total Benefits(\$M)	1.18	3.11	3.92	4.81	5.61	6.23	6.86	7.55	8.27	9.18	10.65	11.82	14.20
Total Costs(\$M)	16.71	20.58	22.85	26.24	29.07	32.08	35.61	39.81	44.64	53.31	75.77	101.96	204.60
Benefit Cost Ratio	0.01	0.05	0.07	0.10	0.13	0.16	0.19	0.21	0.25	0.29	0.35	0.42	0.55

RISK OUTPUT(BAR HGHTS)*3	USER_BEN	EMISS	ACCID	NOISE	TOT_BEN	TOT_CST	BC_RATIO
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Intervals

0 -	0.0050	0.1060	0.0030	0.1320	0.0020	0.0565	0.0115
1 -	0.0080	0.1160	0.0035	0.1540	0.0070	0.1295	0.0145
2 -	0.0140	0.1420	0.0020	0.1480	0.0040	0.1590	0.0220
3 -	0.0170	0.1140	0.0025	0.0925	0.0080	0.1425	0.0360
4 -	0.0190	0.0915	0.0050	0.0790	0.0095	0.1105	0.0290
5 -	0.0260	0.0765	0.0030	0.0660	0.0110	0.0970	0.0420
6 -	0.0310	0.0460	0.0045	0.0475	0.0170	0.0660	0.0445
7 -	0.0395	0.0475	0.0080	0.0390	0.0205	0.0370	0.0475
8 -	0.0420	0.0330	0.0050	0.0380	0.0305	0.0280	0.0540
9 -	0.0360	0.0290	0.0080	0.0230	0.0315	0.0195	0.0540
10 -	0.0370	0.0230	0.0105	0.0260	0.0415	0.0205	0.0550
11 -	0.0430	0.0270	0.0105	0.0160	0.0400	0.0175	0.0470

	2018_ALTA.brp							
12 -	0.0515	0.0175	0.0150	0.0160	0.0400	0.0155	0.0425	
13 -	0.0520	0.0165	0.0175	0.0140	0.0500	0.0125	0.0510	
14 -	0.0400	0.0130	0.0330	0.0110	0.0480	0.0085	0.0470	
15 -	0.0420	0.0120	0.0340	0.0060	0.0610	0.0080	0.0370	
16 -	0.0515	0.0075	0.0445	0.0055	0.0490	0.0070	0.0405	
17 -	0.0485	0.0090	0.0615	0.0100	0.0415	0.0040	0.0445	
18 -	0.0435	0.0065	0.0765	0.0070	0.0490	0.0060	0.0300	
19 -	0.0315	0.0070	0.0970	0.0035	0.0460	0.0045	0.0220	
20 -	0.0375	0.0055	0.1100	0.0035	0.0420	0.0040	0.0330	
21 -	0.0335	0.0035	0.0850	0.0030	0.0485	0.0020	0.0255	
22 -	0.0300	0.0030	0.0640	0.0060	0.0345	0.0040	0.0185	
23 -	0.0285	0.0030	0.0515	0.0025	0.0385	0.0020	0.0200	
24 -	0.0250	0.0025	0.0540	0.0035	0.0300	0.0025	0.0180	
25 -	0.0210	0.0025	0.0425	0.0035	0.0280	0.0025	0.0130	
26 -	0.0210	0.0010	0.0280	0.0020	0.0245	0.0020	0.0095	
27 -	0.0165	0.0030	0.0210	0.0065	0.0200	0.0010	0.0095	
28 -	0.0115	0.0005	0.0160	0.0030	0.0165	0.0010	0.0075	
29 -	0.0125	0.0025	0.0135	0.0020	0.0185	0.0005	0.0120	
30 -	0.0115	0.0030	0.0105	0.0010	0.0115	0.0005	0.0080	
31 -	0.0120	0.0020	0.0100	0.0015	0.0135	0.0010	0.0045	
32 -	0.0085	0.0005	0.0070	0.0020	0.0100	0.0020	0.0045	
33 -	0.0065	0.0010	0.0055	0.0015	0.0050	0.0015	0.0060	
34 -	0.0055	0.0005	0.0035	0.0010	0.0080	0.0005	0.0040	
35 -	0.0050	0.0015	0.0030	0.0010	0.0065	0.0005	0.0025	
36 -	0.0050	0.0010	0.0025	0.0015	0.0075	0.0010	0.0030	
37 -	0.0025	0.0015	0.0035	0.0000	0.0025	0.0015	0.0055	
38 -	0.0040	0.0010	0.0015	0.0005	0.0045	0.0000	0.0020	
39 -	0.0045	0.0005	0.0035	0.0010	0.0030	0.0010	0.0020	

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\2018\_ALTA.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTA\2018\_ALTA.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2018 ALTERNATIVE B**

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## SCENARIO REPORT

SCENARIO - KERNCOG- 2018 MODEL RUN - ALTB SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALT.B\2018\_ALT.BSN

Created - Thursday, January 12, 2012 13:51:57

## SCENARIO ANNUAL RESULTS \*\*

1) TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	5974.6	167.7	0.0	0.0	0.0	0.0	0.0	0.0	6142.3
Improvement Case	6005.2	167.9	0.0	0.0	0.0	0.0	0.0	0.0	6173.2
Change	30.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	30.9
Person Trips (Million/yr)									
Base Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Improvement Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	245.43	4.42	0.00	0.82	0.00	0.00	0.00	0.00	250.67
Change	-1.42	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-1.43
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	245.43	4.42	0.00	0.82	0.00	0.00	0.00	0.00	250.67
Change	-1.42	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-1.43
2) TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	3763.8	228.0	0.0	0.0	0.0	0.0	0.0	0.0	3991.8
CO	7082.0	249.9	0.0	0.0	0.0	0.0	0.0	0.0	7331.9
NOx	592.1	442.2	0.0	0.0	0.0	0.0	0.0	0.0	1034.3
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7
Improvement Case									

HC	3760.9	227.8	0.0	0.0	0.0	0.0	0.0	0.0	3988.8
CO	7085.2	250.0	0.0	0.0	0.0	0.0	0.0	0.0	7335.2
NOx	593.6	442.5	0.0	0.0	0.0	0.0	0.0	0.0	1036.2
PM10	231.7	22.2	0.0	0.0	0.0	0.0	0.0	0.0	253.9

## Change

HC	-2.8	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-3.1
CO	3.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.3
NOx	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.8
PM10	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2

## Cold Start Emissions (Tons/yr)

## Base Case

HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Improvement Case

HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

## Combined VMT and Cold Start Emissions (Tons/yr)

## Base Case

HC	4698.3	243.3	0.0	0.0	0.0	0.0	0.0	0.0	4941.6
CO	34128.9	690.5	0.0	0.0	0.0	0.0	0.0	0.0	34819.4
NOx	978.5	448.5	0.0	0.0	0.0	0.0	0.0	0.0	1427.0
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7

## Improvement Case

HC	4695.5	243.0	0.0	0.0	0.0	0.0	0.0	0.0	4938.5
CO	34132.1	690.6	0.0	0.0	0.0	0.0	0.0	0.0	34822.7
NOx	980.0	448.8	0.0	0.0	0.0	0.0	0.0	0.0	1428.8
PM10	231.7	22.2	0.0	0.0	0.0	0.0	0.0	0.0	253.9

## Change

HC	-2.8	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-3.1
CO	3.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.3
NOx	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.8
PM10	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2

## 3)EMISSION COSTS

## VMT Related Emission Costs (1000\$/yr)

AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
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2018\_ALT.B.rp

Base Case

HC	32029.8	1940.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33970.5
CO	1012.7	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1048.5
NOx	35126.1	26235.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61361.2
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	32005.7	1938.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33944.4
CO	1013.2	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1048.9
NOx	35217.3	26253.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61470.4
PM10	112648.6	10801.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123450.1

Change

HC	-24.2	-1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-26.0
CO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
NOx	91.2	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	109.2
PM10	574.2	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	592.2

Cold Start Emission Costs (1000\$/yr)

Base Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOx	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emission Costs (1000\$/yr)

Base Case

HC	39982.5	2070.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42052.7
CO	4880.4	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.2
NOx	58048.3	26608.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84656.9
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	39958.4	2068.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42026.7
CO	4880.9	98.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.6
NOx	58139.6	26626.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84766.1
PM10	112648.6	10801.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123450.1

Change

HC	-24.2	-1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-26.0
CO	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
NOx	91.2	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	109.2

	2018_ALT.B.rp								
PM10	574.2	18.0	0.0	0.0	0.0	0.0	0.0	0.0	592.2
Total Em. Costs(1000\$/yr)	641.7	34.1	0.0	0.0	0.0	0.0	0.0	0.0	675.8
4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
BTU Energy Consumption(100 Billion BTU/yr)									
Base Case	358.5	32.1	0.0	0.0	0.0	0.0	0.0	0.0	390.5
Improvement Case	358.4	32.1	0.0	0.0	0.0	0.0	0.0	0.0	390.5
Change	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
CO2 Emissions (1,000 Tons/yr)									
Base Case	2796.0	250.1	0.0	0.0	0.0	0.0	0.0	0.0	3046.1
Improvement Case	2795.6	250.3	0.0	0.0	0.0	0.0	0.0	0.0	3045.8
Change	-0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.3
Greenhouse Gas Emissions Costs(1000\$/yr)									
Base Case	132950.9	11891.9	0.0	0.0	0.0	0.0	0.0	0.0	144842.8
Improvement Case	132929.7	11899.5	0.0	0.0	0.0	0.0	0.0	0.0	144829.2
Change	-21.2	7.6	0.0	0.0	0.0	0.0	0.0	0.0	-13.7
5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Number of Accidents									
Fatalities									
Base Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	43.0
Improvement Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	43.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Injuries									
Base Case	4507.3	123.7	0.0	0.0	0.0	0.0	0.0	0.0	4631.0
Improvement Case	4502.0	123.6	0.0	0.0	0.0	0.0	0.0	0.0	4625.6
Change	-5.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-5.3
Property-Damage-Only									
Base Case	7449.9	205.4	0.0	0.0	0.0	0.0	0.0	0.0	7655.3
Improvement Case	7458.7	205.4	0.0	0.0	0.0	0.0	0.0	0.0	7664.1
Change	8.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	8.9
External Accident Costs									
Fatalities (1000\$/yr)									
Base Case	30870.5	859.6	0.0	0.0	0.0	0.0	0.0	0.0	31730.1
Improvement Case	30877.5	859.7	0.0	0.0	0.0	0.0	0.0	0.0	31737.2
Change	7.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	7.2
Injuries (1000\$/yr)									
Base Case	46695.2	1281.5	0.0	0.0	0.0	0.0	0.0	0.0	47976.7
Improvement Case	46640.7	1281.0	0.0	0.0	0.0	0.0	0.0	0.0	47921.6
Change	-54.5	-0.5	0.0	0.0	0.0	0.0	0.0	0.0	-55.1
Property-Damage-Only (1000\$/yr)									

Base Case	11249.3	310.1	0.0	0.0	0.0	0.0	0.0	0.0	11559.5
Improvement Case	11262.6	310.2	0.0	0.0	0.0	0.0	0.0	0.0	11572.8
Change	13.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	13.4
Total Ext. Acc.(1000\$/yr)	-34.2	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	-34.5

6) FUEL AND NON-FUEL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Gallons or Gallon Equivalent (1000gal./yr)									
Base Case	286771.6	23117.0	0.0	0.0	0.0	0.0	0.0	0.0	309888.6
Improvement Case	286725.8	23131.8	0.0	0.0	0.0	0.0	0.0	0.0	309857.5
Change	-45.8	14.8	0.0	0.0	0.0	0.0	0.0	0.0	-31.1
Energy Costs (1000\$/yr)									
Base Case	837373.1	80909.4	0.0	0.0	0.0	0.0	0.0	0.0	918282.6
Improvement Case	837239.3	80961.1	0.0	0.0	0.0	0.0	0.0	0.0	918200.4
Change	-133.8	51.7	0.0	0.0	0.0	0.0	0.0	0.0	-82.1
Non-Fuel Operating Costs (1000\$/yr) *1									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7) EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Noise Costs (1000\$/yr)									
Base Case	5974.6	4659.1	0.0	0.0	0.0	0.0	0.0	0.0	10633.7
Improvement Case	6005.2	4657.5	0.0	0.0	0.0	0.0	0.0	0.0	10662.8
Change	30.6	-1.5	0.0	0.0	0.0	0.0	0.0	0.0	29.1
Other Mileage Based External Costs (1000\$/yr)									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)									
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)									
Change									0.0

8) USER BENEFITS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Benefits (1000\$/yr)									
In-Vehicle Travel Time	15371.2	280.0	0.0	0.0	0.0	0.0	0.0	0.0	15651.3
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	133.8	-51.7	0.0	0.0	0.0	0.0	0.0	0.0	82.1
Non-Fuel Oper. Costs*2	-1714.1	-33.8	0.0	0.0	0.0	0.0	0.0	0.0	-1748.0
Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	270.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0	272.0
Total	14061.2	196.2	0.0	0.0	0.0	0.0	0.0	0.0	14257.4

Revenue Transfers (1000\$/yr)

	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Transfers *2	-35.4	9.6	0.0	0.0	0.0	0.0	0.0	0.0	-25.8
9)PUBLIC VEHICLE OPER. COSTS									
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL			
Capital Cost (1000\$)	630000.0	0.0	0.0	0.0	0.0	630000.0			
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0			
Annualized Cost (1000\$)	29265.9	0.0	0.0	0.0	0.0	29265.9			
Other op/Maint. Cost (1000\$/yr)						0.0			

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	14257.4
Revenue Transfers	-25.8
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-675.8
Global Warming	13.7
Noise	-29.1
Accident	34.5
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	-670.4
Total Benefits	13574.9
Costs To Public Agencies (1000\$/yr)	
Capital Costs	29265.9
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	29265.9
Net Annual worth (1000\$/yr)	-15691.0
Benefit-Cost Ratio	0.5

SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALT.B\BUILD\2015\_ALT.B\_DISTRICT.TXT

Output aggregated by districts at points of Production

## ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds (minutes)	1 5	2 15	3 20	4 25	5 30	6 40	7 50				
VALUE OF TIME	AUTO		TRUCK		CPOOL		L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-vehicle (\$/hr.)	10.83		35.37		10.83		10.83	10.83	10.83	10.83	10.83
Out-of-vehicle (\$/hr.)	21.66		19.17		21.66		21.66	21.66	21.66	21.66	21.66
FUEL COSTS	AUTO		TRUCK								
Dollars Per Gallon	2.92		3.50								
Include Fuel Cost in User Benefits							YES				
FUEL TAXES	AUTO		TRUCK		CPOOL						
Dollars Per Gallon	0.7724		0.6478		0.7724						
NON FUEL COSTS	AUTO		TRUCK								
Dollars Per Gallon	0.056		0.121								
Include Non-Fuel Op. Cost in User Benefits							YES				
FUEL CONSUMPTION RATES(g/mile)	AUTO		TRUCK		LOC.BUS	EX.BUS	L.RAIL	H.RAIL	(Kwhr/Vehicle Mile)		
5 MPH	0.152		0.297		-	-	-	-			
10 MPH	0.114		0.265		-	-	-	-			
15 MPH	0.088		0.215		-	-	-	-			
20 MPH	0.070		0.178		-	-	-	-			
25 MPH	0.059		0.159		-	-	-	-			
30 MPH	0.051		0.148		-	-	-	-			
35 MPH	0.046		0.140		-	-	-	-			
40 MPH	0.043		0.134		-	-	-	-			
45 MPH	0.041		0.130		-	-	-	-			
50 MPH	0.041		0.128		-	-	-	-			
55 MPH	0.043		0.128		-	-	-	-			
60 MPH	0.046		0.130		-	-	-	-			
65 MPH	0.051		0.134		-	-	-	-			
Average	-		-		0.377	0.235	11.090	7.630			
HC EMISSION RATES (gr./mile)	AUTO		TRUCK		BUS	RAIL					
5 MPH	1.700		4.000		-	-					
10 MPH	1.100		3.140		-	-					

15 MPH	0.900	2.520	-	-
20 MPH	0.790	2.070	-	-
25 MPH	0.690	1.730	-	-
30 MPH	0.620	1.490	-	-
35 MPH	0.570	1.300	-	-
40 MPH	0.530	1.170	-	-
45 MPH	0.490	1.070	-	-
50 MPH	0.480	1.000	-	-
55 MPH	0.480	0.960	-	-
60 MPH	0.510	0.940	-	-
65 MPH	0.550	0.940	-	-
Average	-	-	2.520	0.000

CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	1.854	5.210	-	-
10 MPH	1.675	4.226	-	-
15 MPH	1.509	2.784	-	-
20 MPH	1.370	1.941	-	-
25 MPH	1.255	1.613	-	-
30 MPH	1.158	1.442	-	-
35 MPH	1.077	1.333	-	-
40 MPH	1.023	1.271	-	-
45 MPH	0.963	1.247	-	-
50 MPH	0.931	1.257	-	-
55 MPH	0.920	1.301	-	-
60 MPH	0.937	1.381	-	-
65 MPH	0.999	1.505	-	-
Average	-	-	3.210	0.000

NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
5 MPH	0.159	5.234	-	-
10 MPH	0.138	4.626	-	-
15 MPH	0.122	3.666	-	-
20 MPH	0.109	3.039	-	-
25 MPH	0.100	2.749	-	-
30 MPH	0.093	2.565	-	-
35 MPH	0.088	2.421	-	-
40 MPH	0.085	2.317	-	-
45 MPH	0.084	2.253	-	-
50 MPH	0.084	2.230	-	-
55 MPH	0.086	2.251	-	-
60 MPH	0.089	2.321	-	-
65 MPH	0.094	2.448	-	-
Average	-	-	16.200	0.000

PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL
Average	0.035	0.120	0.100	0.000

COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOX	PM10
Average	8510.0	143.0	59325.0	486207.0

EMISSIONS PER COLD START	HC	CO	NOx	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	105.49	105.49	-	-
2nd Highway Class	83.62	83.62	-	-
3rd Highway Class	148.57	148.57	-	-
4th Highway Class	123.65	123.65	-	-
5th Highway Class	84.91	84.91	-	-
6th Highway Class	97.32	97.32	-	-
Average	-	-	3.656	0.000

NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL		
Capital Costs (1,000\$)	630000	0	0	0	0	630000		
Mid Point Construction	2016	0	0	0	0	-		
Year Opening	2018	0	0	0	0	-		
Useful Life	30	0	0	0	0	-		
Salvage Value (1,000\$)	0	0	0	0	0	-		
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-		
Other Operating and Maintenance Costs (1,000\$)						0		

## Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_NETWORK.TXT

Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.BUILD_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.NOBUILD\2015_NB.EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.NOBUILD\2015_NB.NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.NOBUILD\2015_NB.NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.NOBUILD\2015_NB.TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT.BUILD\2015_ALT.TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 4

Name	TRANSIT
Mode	Local Bus
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000

Expansion Factor	296.0
O/D Trip Split Factor	100.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\NOBUILD\2015_NB_TRANSIT_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALT\BUILD\2015_ALT_TRANSIT_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## RISK ANALYSIS INPUT VARIABLES

LOW HIGH

In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105
Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor)	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor)	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0

Fatality Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH
99TH												
User Benefit(\$M)	7.57	9.00	9.99	11.22	12.22	13.05	14.16	15.15	16.34	17.65	19.96	21.97
25.91												
Emission Costs(\$M)	0.07	0.18	0.24	0.38	0.50	0.62	0.77	0.96	1.24	1.69	2.45	3.44
6.58												
Accident Costs(\$M)	-0.33	-0.18	-0.13	-0.08	-0.06	-0.04	-0.03	-0.02	-0.01	-0.00	0.01	0.03
0.06												
Noise Costs(\$M)	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.10	0.16
0.28												
Total Benefits(\$M)	5.12	7.52	8.65	9.99	11.00	12.02	12.92	14.11	15.27	16.67	19.00	21.12
24.81												
Total Costs(\$M)	14.64	18.03	20.02	22.99	25.47	28.10	31.20	34.88	39.12	46.71	66.39	89.33
179.28												
Benefit Cost Ratio	0.05	0.13	0.17	0.24	0.30	0.35	0.40	0.46	0.53	0.62	0.74	0.87
1.15												

RISK OUTPUT(BAR HGHTS)*3	USER_BEN	EMISS	ACCID	NOISE	TOT_BEN	TOT_CST	BC_RATIO
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Intervals

0 -	0.0065	0.0840	0.0010	0.1320	0.0055	0.0565	0.0125
1 -	0.0140	0.1195	0.0000	0.1540	0.0075	0.1295	0.0135
2 -	0.0160	0.1405	0.0015	0.1480	0.0065	0.1590	0.0210
3 -	0.0210	0.1115	0.0015	0.0925	0.0095	0.1425	0.0295
4 -	0.0255	0.0990	0.0030	0.0790	0.0135	0.1105	0.0365
5 -	0.0300	0.0765	0.0020	0.0660	0.0165	0.0970	0.0325
6 -	0.0375	0.0525	0.0015	0.0475	0.0270	0.0660	0.0480
7 -	0.0425	0.0415	0.0020	0.0390	0.0335	0.0370	0.0440
8 -	0.0410	0.0415	0.0025	0.0380	0.0345	0.0280	0.0450
9 -	0.0510	0.0255	0.0025	0.0230	0.0425	0.0195	0.0555
10 -	0.0555	0.0265	0.0040	0.0260	0.0475	0.0205	0.0530
11 -	0.0545	0.0220	0.0040	0.0160	0.0485	0.0175	0.0565
12 -	0.0445	0.0235	0.0040	0.0160	0.0530	0.0155	0.0545
13 -	0.0370	0.0185	0.0035	0.0140	0.0440	0.0125	0.0500
14 -	0.0410	0.0125	0.0060	0.0110	0.0625	0.0085	0.0440
15 -	0.0510	0.0100	0.0050	0.0060	0.0465	0.0080	0.0385
16 -	0.0420	0.0095	0.0065	0.0055	0.0400	0.0070	0.0440
17 -	0.0385	0.0055	0.0070	0.0100	0.0440	0.0040	0.0310

	2018_ALT.Brp							
18 -	0.0375	0.0115	0.0080	0.0070	0.0425	0.0060	0.0380	
19 -	0.0370	0.0050	0.0095	0.0035	0.0410	0.0045	0.0270	
20 -	0.0365	0.0060	0.0140	0.0035	0.0385	0.0040	0.0295	
21 -	0.0315	0.0050	0.0130	0.0030	0.0345	0.0020	0.0305	
22 -	0.0235	0.0040	0.0180	0.0060	0.0425	0.0040	0.0185	
23 -	0.0250	0.0025	0.0270	0.0025	0.0260	0.0020	0.0220	
24 -	0.0185	0.0035	0.0220	0.0035	0.0290	0.0025	0.0175	
25 -	0.0155	0.0015	0.0295	0.0035	0.0210	0.0025	0.0145	
26 -	0.0150	0.0030	0.0340	0.0020	0.0175	0.0020	0.0075	
27 -	0.0150	0.0015	0.0450	0.0065	0.0110	0.0010	0.0100	
28 -	0.0140	0.0025	0.0485	0.0030	0.0145	0.0010	0.0090	
29 -	0.0070	0.0020	0.0570	0.0020	0.0160	0.0005	0.0080	
30 -	0.0120	0.0020	0.0680	0.0010	0.0105	0.0005	0.0065	
31 -	0.0090	0.0025	0.1015	0.0015	0.0100	0.0010	0.0050	
32 -	0.0060	0.0025	0.1135	0.0020	0.0095	0.0020	0.0045	
33 -	0.0045	0.0010	0.1075	0.0015	0.0070	0.0015	0.0035	
34 -	0.0055	0.0000	0.0920	0.0010	0.0060	0.0005	0.0035	
35 -	0.0065	0.0010	0.0510	0.0010	0.0045	0.0005	0.0035	
36 -	0.0025	0.0010	0.0280	0.0015	0.0045	0.0010	0.0045	
37 -	0.0040	0.0005	0.0215	0.0000	0.0035	0.0015	0.0015	
38 -	0.0025	0.0010	0.0080	0.0005	0.0030	0.0000	0.0035	
39 -	0.0025	0.0005	0.0065	0.0005	0.0050	0.0005	0.0025	

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALT\2018\_ALT.Bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALT\2018\_ALT.Ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.



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**STEAM 2.0 MODEL OUTPUT  
YEAR 2018 ALTERNATIVE C**

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FEDERAL HIGHWAY ADMINISTRATION  
SURFACE TRANSPORTATION EFFICIENCY ANALYSIS MODEL (STEAM) version 2.0.1

## SCENARIO REPORT

SCENARIO - KERNCOG- 2018 MODEL RUN - ALTC SCENARIO ( NEW PARAMETERS 01/11/12)

File Name - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\2018\_ALTC9.bsn  
Created - Thursday, January 12, 2012 13:28:40

## SCENARIO ANNUAL RESULTS \*\*

1)TRAVEL DEMAND	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
VMT (Million VMT/yr)									
Base Case	5974.6	167.7	0.0	0.0	0.0	0.0	0.0	0.0	6142.3
Improvement Case	5994.7	167.9	0.0	0.0	0.0	0.0	0.0	0.0	6162.6
Change	20.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	20.3
Person Trips (Million/yr)									
Base Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Improvement Case	976.8	11.1	0.0	5.5	0.0	0.0	0.0	0.0	993.3
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	244.50	4.42	0.00	0.81	0.00	0.00	0.00	0.00	249.73
Change	-2.35	-0.01	0.00	-0.00	0.00	0.00	0.00	0.00	-2.37
Out-Of-Vehicle Travel Time (Million Person Hrs./yr)									
Base Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Improvement Case	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Travel Time (Million Person Hrs./yr)									
Base Case	246.85	4.43	0.00	0.82	0.00	0.00	0.00	0.00	252.10
Improvement Case	244.50	4.42	0.00	0.81	0.00	0.00	0.00	0.00	249.73
Change	-2.35	-0.01	0.00	-0.00	0.00	0.00	0.00	0.00	-2.37
2)TONS OF EMISSIONS									
VMT Related Emissions (Tons/yr)									
Base Case									
HC	3763.8	228.0	0.0	0.0	0.0	0.0	0.0	0.0	3991.8
CO	7082.0	249.9	0.0	0.0	0.0	0.0	0.0	0.0	7331.9
NOX	592.1	442.2	0.0	0.0	0.0	0.0	0.0	0.0	1034.3
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7

2018\_ALTC9.brp

Improvement Case									
HC	3749.9	227.7	0.0	0.0	0.0	0.0	0.0	0.0	3977.6
CO	7066.2	249.8	0.0	0.0	0.0	0.0	0.0	0.0	7316.0
NOx	592.2	442.3	0.0	0.0	0.0	0.0	0.0	0.0	1034.5
PM10	231.3	22.2	0.0	0.0	0.0	0.0	0.0	0.0	253.5
Change									
HC	-13.9	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	-14.3
CO	-15.8	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	-15.8
NOx	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
PM10	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Cold Start Emissions (Tons/yr)									
Base Case									
HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case									
HC	934.5	15.2	0.0	0.0	0.0	0.0	0.0	0.0	949.7
CO	27046.9	440.6	0.0	0.0	0.0	0.0	0.0	0.0	27487.5
NOx	386.4	6.3	0.0	0.0	0.0	0.0	0.0	0.0	392.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change									
HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combined VMT and Cold Start Emissions (Tons/yr)									
Base Case									
HC	4698.3	243.3	0.0	0.0	0.0	0.0	0.0	0.0	4941.6
CO	34128.9	690.5	0.0	0.0	0.0	0.0	0.0	0.0	34819.4
NOx	978.5	448.5	0.0	0.0	0.0	0.0	0.0	0.0	1427.0
PM10	230.5	22.2	0.0	0.0	0.0	0.0	0.0	0.0	252.7
Improvement Case									
HC	4684.4	242.9	0.0	0.0	0.0	0.0	0.0	0.0	4927.3
CO	34113.1	690.5	0.0	0.0	0.0	0.0	0.0	0.0	34803.5
NOx	978.6	448.6	0.0	0.0	0.0	0.0	0.0	0.0	1427.2
PM10	231.3	22.2	0.0	0.0	0.0	0.0	0.0	0.0	253.5
Change									
HC	-13.9	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	-14.3
CO	-15.8	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	-15.8
NOx	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
PM10	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8

3)EMISSION COSTS

AUTO TRUCK CPOOL L-BUS X-BUS L-RAIL H-RAIL OTHER TOTAL

VMT Related Emission Costs (1000\$/yr)

Base Case

HC	32029.8	1940.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33970.5
CO	1012.7	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1048.5
NOX	35126.1	26235.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61361.2
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	31911.5	1937.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33849.0
CO	1010.5	35.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1046.2
NOX	35131.3	26241.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61373.2
PM10	112450.4	10798.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123248.8

Change

HC	-118.4	-3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-121.5
CO	-2.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.3
NOX	5.2	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
PM10	376.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.9

Cold Start Emission Costs (1000\$/yr)

Base Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOX	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Improvement Case

HC	7952.7	129.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8082.2
CO	3867.7	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3930.7
NOX	22922.2	373.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23295.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Change

HC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Combined VMT and Cold Start Emission Costs (1000\$/yr)

Base Case

HC	39982.5	2070.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42052.7
CO	4880.4	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4979.2
NOX	58048.3	26608.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84656.9
PM10	112074.4	10783.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	122857.9

Improvement Case

HC	39864.1	2067.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41931.2
CO	4878.2	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4976.9
NOX	58053.5	26615.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84668.8
PM10	112450.4	10798.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	123248.8

Change

HC	-118.4	-3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-121.5
CO	-2.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.3
NOx	5.2	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
PM10	376.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.9

Total Em. Costs(1000\$/yr)	260.6	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	279.2
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4)GREENHOUSE GAS EMISSIONS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
BTU Energy Consumption(100 Billion BTU/yr)										
Base Case	358.5	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	390.5
Improvement Case	357.3	32.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	389.4
Change	-1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.2
CO2 Emissions (1,000 Tons/yr)										
Base Case	2796.0	250.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3046.1
Improvement Case	2786.9	250.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3037.0
Change	-9.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-9.1
Greenhouse Gas Emissions Costs(1000\$/yr)										
Base Case	132950.9	11891.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	144842.8
Improvement Case	132517.2	11894.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	144411.7
Change	-433.8	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-431.2

5)ACCIDENTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL	
Number of Accidents										
Fatalities										
Base Case	41.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0
Improvement Case	41.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.8
Change	-0.2	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
Injuries										
Base Case	4507.3	123.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4631.0
Improvement Case	4483.2	123.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4606.8
Change	-24.0	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-24.2
Property-Damage-Only										
Base Case	7449.9	205.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7655.3
Improvement Case	7437.6	205.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7642.9
Change	-12.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-12.4
External Accident Costs										
Fatalities (1000\$/yr)										
Base Case	30870.5	859.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31730.1
Improvement Case	30699.3	858.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31557.8
Change	-171.2	-1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-172.3
Injuries (1000\$/yr)										
Base Case	46695.2	1281.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47976.7

Improvement Case	46446.2	1279.8	0.0	0.0	0.0	0.0	0.0	0.0	47726.0
Change	-249.1	-1.7	0.0	0.0	0.0	0.0	0.0	0.0	-250.7
Property-Damage-Only (1000\$/yr)									
Base Case	11249.3	310.1	0.0	0.0	0.0	0.0	0.0	0.0	11559.5
Improvement Case	11230.7	310.1	0.0	0.0	0.0	0.0	0.0	0.0	11540.8
Change	-18.6	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-18.7
Total Ext. Acc.(1000\$/yr)	-438.9	-2.8	0.0	0.0	0.0	0.0	0.0	0.0	-441.8
6) FUEL AND NON-FUEL COSTS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Gallons or Gallon Equivalent (1000gal./yr)									
Base Case	286771.6	23117.0	0.0	0.0	0.0	0.0	0.0	0.0	309888.6
Improvement Case	285836.0	23122.0	0.0	0.0	0.0	0.0	0.0	0.0	308958.0
Change	-935.6	5.0	0.0	0.0	0.0	0.0	0.0	0.0	-930.6
Energy Costs (1000\$/yr)									
Base Case	837373.1	80909.4	0.0	0.0	0.0	0.0	0.0	0.0	918282.6
Improvement Case	834641.2	80926.9	0.0	0.0	0.0	0.0	0.0	0.0	915568.1
Change	-2732.0	17.5	0.0	0.0	0.0	0.0	0.0	0.0	-2714.5
Non-Fuel Operating Costs (1000\$/yr) *1									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7) EXTERNAL COSTS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Noise Costs (1000\$/yr)									
Base Case	5974.6	4659.1	0.0	0.0	0.0	0.0	0.0	0.0	10633.7
Improvement Case	5994.7	4651.4	0.0	0.0	0.0	0.0	0.0	0.0	10646.1
Change	20.0	-7.7	0.0	0.0	0.0	0.0	0.0	0.0	12.4
Other Mileage Based External Costs (1000\$/yr)									
Base Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvement Case	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-Mileage Based External Costs (1000\$/yr)									
Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
External Cost During Construction (1000\$/yr)									
Change									0.0
8) USER BENEFITS									
	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Benefits (1000\$/yr)									
In-Vehicle Travel Time	25494.8	435.1	0.0	0.0	0.0	0.0	0.0	0.0	25929.8
Out-of-Veh.Travel Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Costs *2	2732.0	-17.5	0.0	0.0	0.0	0.0	0.0	0.0	2714.5
Non-Fuel Oper. Costs*2	-1122.6	-28.1	0.0	0.0	0.0	0.0	0.0	0.0	-1150.6

Out-of-Pocket Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intern. Accident Cst.*2	3571.0	16.1	0.0	0.0	0.0	0.0	0.0	0.0	3587.1
Total	30675.1	405.7	0.0	0.0	0.0	0.0	0.0	0.0	31080.8

Revenue Transfers (1000\$/yr)									
Transfers *2	-722.7	3.2	0.0	0.0	0.0	0.0	0.0	0.0	-719.4

9)PUBLIC VEHICLE OPER. COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER	TOTAL
Operating Costs(1000\$/yr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

10)CAPITAL COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL
Capital Cost (1000\$)	673000.0	0.0	0.0	0.0	0.0	673000.0
Salvage Value (1000\$)	0.0	0.0	0.0	0.0	0.0	0.0
Annualized Cost (1000\$)	31263.4	0.0	0.0	0.0	0.0	31263.4
Other Op/Maint. Cost (1000\$/yr)						0.0

## 11)SUMMARY

Benefits (1000\$/yr)	TOTAL
User Benefits	31080.8
Revenue Transfers	-719.4
Fuel Costs *1	0.0
Non-Fuel Op. Costs *1	0.0
Reduction in External Costs	
Emissions	-279.2
Global Warming	431.2
Noise	-12.4
Accident	441.8
Other Mileage Based	0.0
Other Non-Mileage Based	-0.0
Construction Period	0.0
Subtotal	150.2
Total Benefits	30942.8

## Costs To Public Agencies (1000\$/yr)

Capital Costs	31263.4
Public Vehicle Oper. Cost	0.0
Other Operating & Maint. Costs	0.0
Total Costs to Public Agencies	31263.4

Net Annual worth (1000\$/yr)	-320.6
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Benefit-Cost Ratio	1.0
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## SCENARIO ASSUMPTIONS

DISTRICT DATA FILE - C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\BUILD\2015\_ALTC9\_DISTRICT.TXT

Output aggregated by districts at points of Production

## ACCESSIBILITY

Dispersion parameter (alpha) 0.5

Time thresholds (minutes)	1 5	2 15	3 20	4 25	5 30	6 40	7 50
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VALUE OF TIME	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
In-vehicle (\$/hr.)	10.83	35.37	10.83	10.83	10.83	10.83	10.83	10.83
Out-of-vehicle (\$/hr.)	21.66	19.17	21.66	21.66	21.66	21.66	21.66	21.66

FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	2.92	3.50

Include Fuel Cost in User Benefits YES

FUEL TAXES	AUTO	TRUCK	CPOOL
Dollars Per Gallon	0.7724	0.6478	0.7724

NON FUEL COSTS	AUTO	TRUCK
Dollars Per Gallon	0.056	0.121

Include Non-Fuel Op. Cost in User Benefits YES

FUEL CONSUMPTION RATES(g/mile)	AUTO	TRUCK	LOC.BUS	EX.BUS	L.RAIL (kwhr/vehicle Mile)	H.RAIL
5 MPH	0.152	0.297	-	-	-	-
10 MPH	0.114	0.265	-	-	-	-
15 MPH	0.088	0.215	-	-	-	-
20 MPH	0.070	0.178	-	-	-	-
25 MPH	0.059	0.159	-	-	-	-
30 MPH	0.051	0.148	-	-	-	-
35 MPH	0.046	0.140	-	-	-	-
40 MPH	0.043	0.134	-	-	-	-
45 MPH	0.041	0.130	-	-	-	-
50 MPH	0.041	0.128	-	-	-	-
55 MPH	0.043	0.128	-	-	-	-
60 MPH	0.046	0.130	-	-	-	-

	0.051	0.134	-	-	-	-
65 MPH						
Average			0.377	0.235	11.090	7.630
HC EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.700	4.000	-	-		
10 MPH	1.100	3.140	-	-		
15 MPH	0.900	2.520	-	-		
20 MPH	0.790	2.070	-	-		
25 MPH	0.690	1.730	-	-		
30 MPH	0.620	1.490	-	-		
35 MPH	0.570	1.300	-	-		
40 MPH	0.530	1.170	-	-		
45 MPH	0.490	1.070	-	-		
50 MPH	0.480	1.000	-	-		
55 MPH	0.480	0.960	-	-		
60 MPH	0.510	0.940	-	-		
65 MPH	0.550	0.940	-	-		
Average	-	-	2.520	0.000		
CO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	1.854	5.210	-	-		
10 MPH	1.675	4.226	-	-		
15 MPH	1.509	2.784	-	-		
20 MPH	1.370	1.941	-	-		
25 MPH	1.255	1.613	-	-		
30 MPH	1.158	1.442	-	-		
35 MPH	1.077	1.333	-	-		
40 MPH	1.023	1.271	-	-		
45 MPH	0.963	1.247	-	-		
50 MPH	0.931	1.257	-	-		
55 MPH	0.920	1.301	-	-		
60 MPH	0.937	1.381	-	-		
65 MPH	0.999	1.505	-	-		
Average	-	-	3.210	0.000		
NO EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		
5 MPH	0.159	5.234	-	-		
10 MPH	0.138	4.626	-	-		
15 MPH	0.122	3.666	-	-		
20 MPH	0.109	3.039	-	-		
25 MPH	0.100	2.749	-	-		
30 MPH	0.093	2.565	-	-		
35 MPH	0.088	2.421	-	-		
40 MPH	0.085	2.317	-	-		
45 MPH	0.084	2.253	-	-		
50 MPH	0.084	2.230	-	-		
55 MPH	0.086	2.251	-	-		
60 MPH	0.089	2.321	-	-		
65 MPH	0.094	2.448	-	-		
Average	-	-	16.200	0.000		
PM10 EMISSION RATES (gr./mile)	AUTO	TRUCK	BUS	RAIL		

Average	0.035	0.120	0.100	0.000
COST PER TON OF EMISSIONS(\$/Ton)	HC	CO	NOx	PM10
Average	8510.0	143.0	59325.0	486207.0
EMISSIONS PER COLD START	HC	CO	NOx	PM10
Auto (gr./start)	2.080	60.200	0.860	0.000
Truck (gr./start)	2.080	60.200	0.860	0.000
COLD STARTS PER VEHICLE TRIP	STARTS			
Auto (starts/trip)	0.60			
Truck (starts/trip)	0.60			
GREENHOUSE GAS EMIS. RATES	TONS/M.BTU			
Auto (CO2 tons/mill.BTU)	0.07800			
Truck (CO2 tons/mill.BTU)	0.08000			
Bus (CO2 tons/mill.BTU)	0.08000			
Rail (CO2 tons/mill.BTU)	0.06400			
GREENHOUSE GAS EMIS. COSTS	\$/Ton			
CO2 Emissions	47.55			
COST PER ACCIDENT (\$/accident)	FATAL	INJURY	PDO	
Internal Accident Cost	4181150	58720	8540	
External Accident Cost	737850	10360	1510	
FATALITY RATES (fat/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	0.43	0.43	-	-
2nd Highway Class	0.74	0.74	-	-
3rd Highway Class	0.87	0.87	-	-
4th Highway Class	1.33	1.33	-	-
5th Highway Class	0.65	0.65	-	-
6th Highway Class	0.56	0.56	-	-
Average	-	-	0.034	0.000
INJURY RATES (inj/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL
1st Highway Class	52.93	52.93	-	-
2nd Highway Class	46.39	46.39	-	-
3rd Highway Class	98.57	98.57	-	-
4th Highway Class	86.61	86.61	-	-
5th Highway Class	56.02	56.02	-	-
6th Highway Class	42.98	42.98	-	-
Average	-	-	4.138	0.000
PDO CRASH RATES (pdo/100 mil.VMT)	AUTO	TRUCK	BUS	RAIL

1st Highway Class	105.49	105.49	-	-				
2nd Highway Class	83.62	83.62	-	-				
3rd Highway Class	148.57	148.57	-	-				
4th Highway Class	123.65	123.65	-	-				
5th Highway Class	84.91	84.91	-	-				
6th Highway Class	97.32	97.32	-	-				
Average	-	-	3.656	0.000				
NOISE COSTS (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.001	0.018	-	-				
2nd Highway Class	0.001	0.019	-	-				
3rd Highway Class	0.001	0.037	-	-				
4th Highway Class	0.001	0.043	-	-				
5th Highway Class	0.001	0.055	-	-				
6th Highway Class	0.001	0.054	-	-				
Average	-	-	0.015	0.000				
OTHER MILEAGE EXT.COST (\$/mile)	AUTO	TRUCK	BUS	RAIL				
1st Highway Class	0.000	0.000	-	-				
2nd Highway Class	0.000	0.000	-	-				
3rd Highway Class	0.000	0.000	-	-				
4th Highway Class	0.000	0.000	-	-				
5th Highway Class	0.000	0.000	-	-				
6th Highway Class	0.000	0.000	-	-				
Average	-	-	0.000	0.000				
NON-MILEAGE EXTERNAL COSTS	AUTO	TRUCK	CPOOL	L-BUS	X-BUS	L-RAIL	H-RAIL	OTHER
Total (\$)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TRANSIT AGENCY UNIT COSTS	L.BUS	EX.BUS	L.RAIL	H.RAIL				
\$/Vehicle Mile	0.000	0.000	0.000	0.000				
\$/Vehicle Hour	0.000	0.000	0.000	0.000				
\$/Peak Vehicle	0.000	0.000	0.000	0.000				
TRANSIT DEMAND	L.BUS	EX.BUS	L.RAIL	H.RAIL				
Vehicle Miles (1,000)	0.00	0.00	0.00	0.00				
Vehicle Hours (1,000)	0.00	0.00	0.00	0.00				
Peak Vehicles (1,000)	0.00	0.00	0.00	0.00				
DISCOUNT RATE	VALUE							
Discount Rate	0.0200							
INVESTMENT COSTS	1ST	2ND	3RD	4TH	5TH	TOTAL		
Capital Costs (1,000\$)	673000	0	0	0	0	673000		
Mid Point Construction	2016	0	0	0	0	-		
Year Opening	2018	0	0	0	0	-		
Useful Life	30	0	0	0	0	-		

			2018_ALTC9.brp			
Salvage Value (1,000\$)	0	0	0	0	0	-
Ext. Const. Cost (1,000\$)	0	0	0	0	0	-
Other Operating and Maintenance Costs (1,000\$)						0

MARKET SECTORS - TOTAL # 4

Market Sector # 1

Name	AUTO
Mode	Auto
Base Vehicle Occupancy	1.440
Imp. Vehicle Occupancy	1.440
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_AUTO_PERSON_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_AUTO_PERSON_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

Market Sector # 2

Name	EXTERNALS
Mode	Auto
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	

In-Vehicle	10.83
Out-of-Vehicle	21.66
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_EXTERNAL_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_EXTERNAL_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL
Base Out-of-Pocket Costs	NULL
Imp. In-Vehicle Time	NULL
Imp. Out-of-Vehicle Time	NULL
Imp. Out-of-Pocket Costs	NULL
Market Sector Output File	NULL

## Market Sector # 3

Name	TRUCKS
Mode	Truck
Base Vehicle Occupancy	1.000
Imp. Vehicle Occupancy	1.000
Expansion Factor	296.0
O/D Trip Split Factor	50.0%
Value of Time (\$/hr)	
In-Vehicle	35.37
Out-of-Vehicle	19.17
Accessibility index	YES
Accessibility thresholds	YES
Speed Equation	BPR-Type
Run Base Network	YES
Run Imp. Network	YES
Ignore Travel Times	NO
Base Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.TXT
Base Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_NETWORK.ttf
Imp. Network Input File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.TXT
Imp. Network Output File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_NETWORK.ttf
Centroid File	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_LANDUSE.TXT
Base Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\NOBUILD\2015_NB_TRUCK_TRIPS.TXT
Imp. Trip Table	C:\KERN_NEW\CENTENNIAL\DEC_2010\STEAM\2018_ALTC9\BUILD\2015_ALTC9_TRUCK_TRIPS.TXT
Use In-Vehicle File	NO
Use Out-of-Vehicle File	NO
Use Out-of-Pocket Cost	NO
Base In-Vehicle Time	NULL
Base Out-of-Vehicle Time	NULL

Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## Market Sector # 4

Name TRANSIT  
 Mode Local Bus  
 Base Vehicle Occupancy 1.000  
 Imp. Vehicle Occupancy 1.000  
 Expansion Factor 296.0  
 O/D Trip Split Factor 100.0%  
 Value of Time (\$/hr)  
     In-Vehicle 10.83  
     Out-of-Vehicle 21.66  
 Accessibility index YES  
 Accessibility thresholds YES  
 Speed Equation BPR-Type  
 Run Base Network YES  
 Run Imp. Network YES  
 Ignore Travel Times NO  
 Base Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\NOBUILD\2015\_NB\_NETWORK.TXT  
 Base Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\NOBUILD\2015\_NB\_NETWORK.ttf  
 Imp. Network Input File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\BUILD\2015\_ALTC9\_NETWORK.TXT  
 Imp. Network Output File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\BUILD\2015\_ALTC9\_NETWORK.ttf  
 Centroid File C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\BUILD\2015\_ALTC9\_LANDUSE.TXT  
 Base Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\NOBUILD\2015\_NB\_TRANSIT\_PERSON\_TRIPS.TXT  
 Imp. Trip Table C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\BUILD\2015\_ALTC9\_TRANSIT\_PERSON\_TRIPS.TXT  
 Use In-Vehicle File NO  
 Use Out-of-Vehicle File NO  
 Use Out-of-Pocket Cost NO  
 Base In-Vehicle Time NULL  
 Base Out-of-Vehicle Time NULL  
 Base Out-of-Pocket Costs NULL  
 Imp. In-Vehicle Time NULL  
 Imp. Out-of-Vehicle Time NULL  
 Imp. Out-of-Pocket Costs NULL  
 Market Sector Output File NULL

## RISK ANALYSIS INPUT VARIABLES

	LOW	HIGH
In-Veh. Value of Time - Auto (Factor)	0.0	1.5
In-Veh. Value of Time - Truck (Factor)	0.0	1.5
In-Veh. Value of Time - Transit (Factor)	0.0	1.5
Out-Veh. Value of Time - Auto (Factor)	0.0	1.5
Out-Veh. Value of Time - Truck (Factor)	0.0	1.5
Out-Veh. Value of Time - Transit (Factor)	0.0	1.5
Discount Rate (Factor)	0.046	0.105

Fuel Consumption Rate Factor (Factor)	0.0	1.5
Fuel Prices Factor (Factor)	0.0	1.5
HC Cost Per Ton (\$/Ton)	0.0	8075.0
CO Cost Per Ton (\$/Ton)	0.0	17700.0
NOx Cost Per Ton (\$/Ton)	0.0	16985.0
PM10 Cost Per Ton (\$/Ton)	0.0	39990.5
HC Rate Factor (Factor))	0.0	5.0
CO Rate Factor (Factor)	0.0	5.0
NOx Rate Factor (Factor))	0.0	5.0
PM10 Rate Factor (Factor)	0.0	5.0
Fatalty Cost Factor (Factor)	0.0	3.0
Injury Cost Factor (Factor)	0.0	3.0
PDO Cost Factor (Factor)	0.0	3.0
Fatalty Rate Factor (Factor)	0.0	2.0
Injury Rate Factor (Factor)	0.0	2.0
PDO Rate Factor (Factor)	0.0	2.0
Noise Cost Factor (Factor)	0.0	5.0
Other External Cost Factor (Factor)	0.0	5.0
Capital Cost Factor (Factor)	0.0	1.5
Salvage Value Factor (Factor)	0.0	1.5
Operating Cost Factor (Factor)	0.0	1.5

RISK OUTPUT(PERCENTILES)	1ST	5TH	10TH	20TH	30TH	40TH	50TH	60TH	70TH	80TH	90TH	95TH	99TH
User Benefit(\$M)	16.61	19.47	21.07	22.97	24.65	26.14	27.89	29.63	31.60	33.98	37.77	41.32	48.24
Emission Costs(\$M)	-3.55	-0.68	-0.25	-0.04	0.06	0.14	0.23	0.33	0.48	0.75	1.29	1.92	4.11
Accident Costs(\$M)	-1.95	-1.32	-1.05	-0.83	-0.69	-0.59	-0.52	-0.45	-0.37	-0.32	-0.26	-0.21	-0.15
Noise Costs(\$M)	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.07	0.12
Total Benefits(\$M)	16.08	19.07	20.78	22.90	24.58	26.16	27.80	29.66	31.66	34.12	38.00	41.40	48.66
Total Costs(\$M)	15.64	19.26	21.39	24.56	27.21	30.02	33.33	37.26	41.79	49.90	70.92	95.43	191.51
Benefit Cost Ratio	0.12	0.28	0.38	0.52	0.64	0.73	0.83	0.93	1.05	1.20	1.42	1.65	2.17

RISK OUTPUT(BAR HGHTS)*3	USER_BEN	EMISS	ACCID	NOISE	TOT_BEN	TOT_CST	BC_RATIO
Intervals							
0 -	0.0070	0.0005	0.0025	0.1320	0.0085	0.0565	0.0080
1 -	0.0120	0.0000	0.0020	0.1540	0.0125	0.1295	0.0100
2 -	0.0125	0.0000	0.0010	0.1480	0.0075	0.1590	0.0165
3 -	0.0165	0.0015	0.0010	0.0925	0.0165	0.1425	0.0255
4 -	0.0265	0.0005	0.0010	0.0790	0.0250	0.1105	0.0255
5 -	0.0285	0.0000	0.0010	0.0660	0.0265	0.0970	0.0350
6 -	0.0375	0.0005	0.0025	0.0475	0.0315	0.0660	0.0360
7 -	0.0465	0.0020	0.0035	0.0390	0.0475	0.0370	0.0375
8 -	0.0490	0.0015	0.0025	0.0380	0.0445	0.0280	0.0430
9 -	0.0450	0.0040	0.0050	0.0230	0.0535	0.0195	0.0450
10 -	0.0475	0.0025	0.0050	0.0260	0.0470	0.0205	0.0570
11 -	0.0590	0.0035	0.0020	0.0160	0.0515	0.0175	0.0520

	2018_ALTC9.brp						
12 -	0.0525	0.0070	0.0080	0.0160	0.0515	0.0155	0.0580
13 -	0.0375	0.0070	0.0025	0.0140	0.0505	0.0125	0.0530
14 -	0.0435	0.0095	0.0055	0.0110	0.0475	0.0085	0.0495
15 -	0.0495	0.0135	0.0070	0.0060	0.0410	0.0080	0.0470
16 -	0.0415	0.0285	0.0075	0.0055	0.0415	0.0070	0.0435
17 -	0.0450	0.0625	0.0100	0.0100	0.0475	0.0040	0.0390
18 -	0.0360	0.1755	0.0065	0.0070	0.0350	0.0060	0.0380
19 -	0.0350	0.2240	0.0155	0.0035	0.0350	0.0045	0.0350
20 -	0.0355	0.1385	0.0135	0.0035	0.0355	0.0040	0.0325
21 -	0.0285	0.0790	0.0185	0.0030	0.0305	0.0020	0.0315
22 -	0.0260	0.0530	0.0200	0.0060	0.0245	0.0040	0.0255
23 -	0.0280	0.0415	0.0205	0.0025	0.0280	0.0020	0.0205
24 -	0.0145	0.0285	0.0255	0.0035	0.0215	0.0025	0.0205
25 -	0.0215	0.0200	0.0295	0.0035	0.0170	0.0025	0.0125
26 -	0.0115	0.0195	0.0290	0.0020	0.0135	0.0020	0.0105
27 -	0.0120	0.0100	0.0420	0.0065	0.0110	0.0010	0.0130
28 -	0.0140	0.0100	0.0390	0.0030	0.0160	0.0010	0.0125
29 -	0.0110	0.0095	0.0460	0.0020	0.0095	0.0005	0.0080
30 -	0.0095	0.0055	0.0575	0.0010	0.0115	0.0005	0.0065
31 -	0.0095	0.0035	0.0660	0.0015	0.0085	0.0010	0.0055
32 -	0.0050	0.0040	0.0625	0.0020	0.0030	0.0020	0.0045
33 -	0.0060	0.0025	0.0605	0.0015	0.0065	0.0015	0.0045
34 -	0.0045	0.0045	0.0645	0.0010	0.0055	0.0005	0.0035
35 -	0.0050	0.0020	0.0885	0.0010	0.0055	0.0005	0.0035
36 -	0.0030	0.0030	0.0670	0.0015	0.0025	0.0010	0.0040
37 -	0.0040	0.0000	0.0630	0.0000	0.0040	0.0015	0.0020
38 -	0.0020	0.0010	0.0445	0.0005	0.0030	0.0000	0.0030
39 -	0.0010	0.0005	0.0315	0.0010	0.0015	0.0010	0.0020

NOTES

- \*\* Disconnected zone pairs were excluded from the analysis.  
Detailed information about disconnected zone pairs of all market sectors can be found in the following files:  
Base case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\2018\_ALTC9.bsx.txt  
Improvement case: C:\KERN\_NEW\CENTENNIAL\DEC\_2010\STEAM\2018\_ALTC9\2018\_ALTC9.ipx.txt
- \*1 These sections are not relevant if costs were considered in User Benefits
- \*2 These values may differ from those in Section 5 & 6;  
Please refer to the User's Guide for explanation of internal benefits computations.
- \*3 Bar Heights are 40 evenly spaced intervals from the 1st to the 99th percentile value with the percentage of observations falling into each interval. This information is used to graph the risk analysis results.